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Studio 44

See other Studio 44 book for removing Platen

Und 24 is same parts as 44
Except Casing etc

olivetti

Technical Service Dept.

STUDIO 44

INTERNAL PUBLICATION CONFIDENTIAL

3865330 N

Studio 45 Remove platen by counterclockwise LH Rod
Take RH bolt off with allen wrench. Take end Covers off
Remove small bolt on tie down clamp of RH End Cap.

Printed in Italy

Stabilimento Grafico G. CANALE & C. - C.so San Maurizio 42 A - Torino

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USE AND FEATURES

TYPE AND SPACING

Number or Symbol	Designation of type	Printing pitch	Number of spaces
0	Modern Pica	2.6	90
1	Pica		
5	Medium Roman Italie		
8	Russian Pica		
41	Pica Double Gothic		
41 bis	Shorthand		
50	Greek		
51	Medium roman		
56	Hindustani		
64	Pica Italic		
69	Hebrew		
101	Large pica		
153	Double Gothic pin point		
218	Small Pica Double Gothic		
290	Pica Single Gothic and pin point		
336	Bulgarian latin		
I. C.	Pica Single Gothic		
7	Elite	2.23	105
76	Elite Italic		
84	Elite Book		
213	Elite Double Gothic		
507	Greek Elite		

LINE SPACING

Name	Line space in mm.				Number of teeth on wheel
9.5 LINE SPACING	4.75	7.125	9.5	11.875	54
STANDARD	5	7.5	10	12.5	52
ZURICH 1	4.53	6.8	9.07	11.34	57
ENGLISH	4.25	8.5	12.75	—	61
Ruys'	4.25	6.37	8.5	12.75	61

1 — Shift key
2 — Shift lock key
3 — Setting and clearing lever for tabulator stops
4 — Margin release key
5 — Touch control (protected by movable cover)
6 — Line spacing lever
7 — Carriage lock lever
8 — Clutch knob
9 — Line spacing selector lever
10 — Carriage release levers
11 — Sliding paper guide
12 — Margin block
13 — Folding paper supports
14 — Bail rod frame
15 — Line finder indicator
16 — Paper release lever
17 — Two-colour and stencil lever
18 — Back space key
19 — Single tabulator key
20 — Space bar

Line spacing.

Line space lever 6 folds back when the machine is to be put into its case.

The position of the small line spacing selector lever 9 determines the distance between the lines of typescript (line spacing). It has four positions in addition to position 0.

Position 0 releases the platen from the line spacing mechanism to enable writing between the lines of typescript and then returning to the previous line spacing.

Clutch.

This enables typing to be commenced at the desired height on the page, corrections to be made or words added between lines after the sheet has been taken out of the machine. If the sheet is still in the machine, it is more convenient to use the zero line spacing with which it is possible to return automatically to the previous spacing.

Paper supports

Paper supports 13 are lifted up during typing.

Margin setters and margin release key.

Light pressure of the fingers moves the two margin setters 12 along their own graduated bar to adjust the length of the typewritten lines as desired.

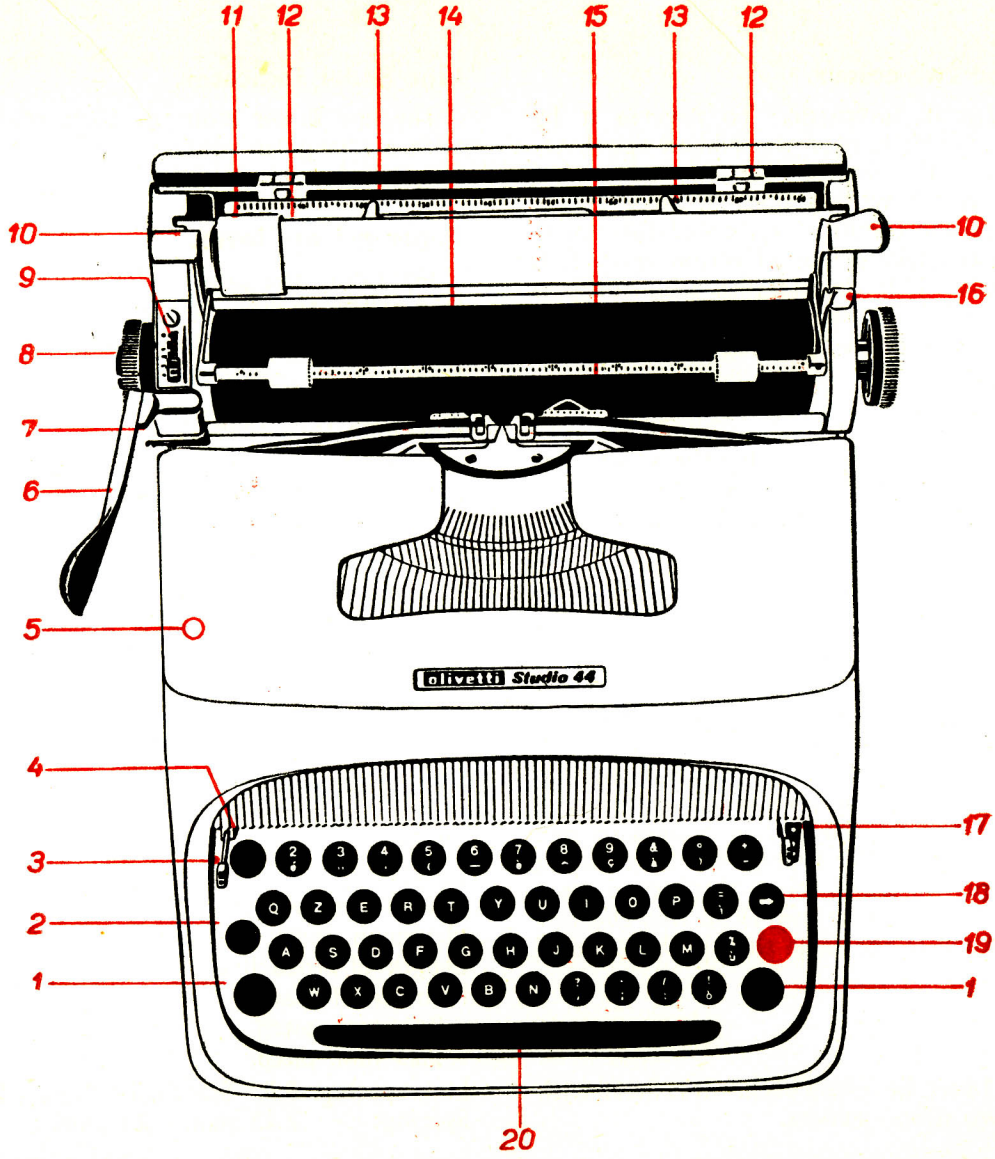
By means of the margin release key 4 it is possible for:

— typing to be continued past the right hand margin;

— the left hand margin to be passed on the carriage return;

— indentation to be obtained automatically.

It is only necessary to press this key during the return of the carriage and the typing line will start some spaces from the left hand margin.


11
12
13
14
15
13
12
10
9
8
7
6
5
10
16
4
3
2
1
17
18
19
1
20
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Ribbon reverse and two-colour.

The ribbon reverse is automatic. To reverse it by hand, push the fork which is near the ribbon spool, towards the centre with the finger. The two-colour and stencil lever 17 serves for writing both in black and in red. The middle position (white disc), called the " neutral " position, puts the ribbon out of action when it is desired to cut stencils. It is necessary to take due precautions in case some of the substances with which stencils are sometimes impregnated are injurious to the platen.

Touch control.

The touch can be regulated by adjusting the small lever 5 which is to be found under the movable cover.

Position 1 is for the lightest touch and position 4 for the heaviest.

Single tabulator.

This enables words or figures to be aligned in vertical columns. To use it, any stops that were previously set should be cleared by running the carriage its full length whilst small lever 3 is held back.

To set the tabulator stops, the carriage should be run to the point desired and the small lever 3 pushed forward. On striking tabulator key 19, the carriage comes to rest on the first stop thus set. After typing, key 19 is struck again and the carriage will travel on to the second stop. To clear an individual stop, strike key 19 so that the carriage stops against it and at the same time push the small lever 3 backwards.

Bail rod frame.

The bail rod frame 14 can be folded back. It is fitted with graduated bar and two slidin rollers.

Line finder indicator.

The line finder indicator 15 is graduated and provided with a triangular window so that horizontal and vertical lines can be drawn with a pencil.

Paper release lever.

Operating the paper release lever 16 causes the paper feed rollers to move away from the platen. It is therefore possible to insert several sheets with the necessary carbon paper.

Carriage lock lever.

The carriage lock lever 7 is used when the machine is being carried. The carriage thus remains locked and does not rest on the movable tooth of the escapement.

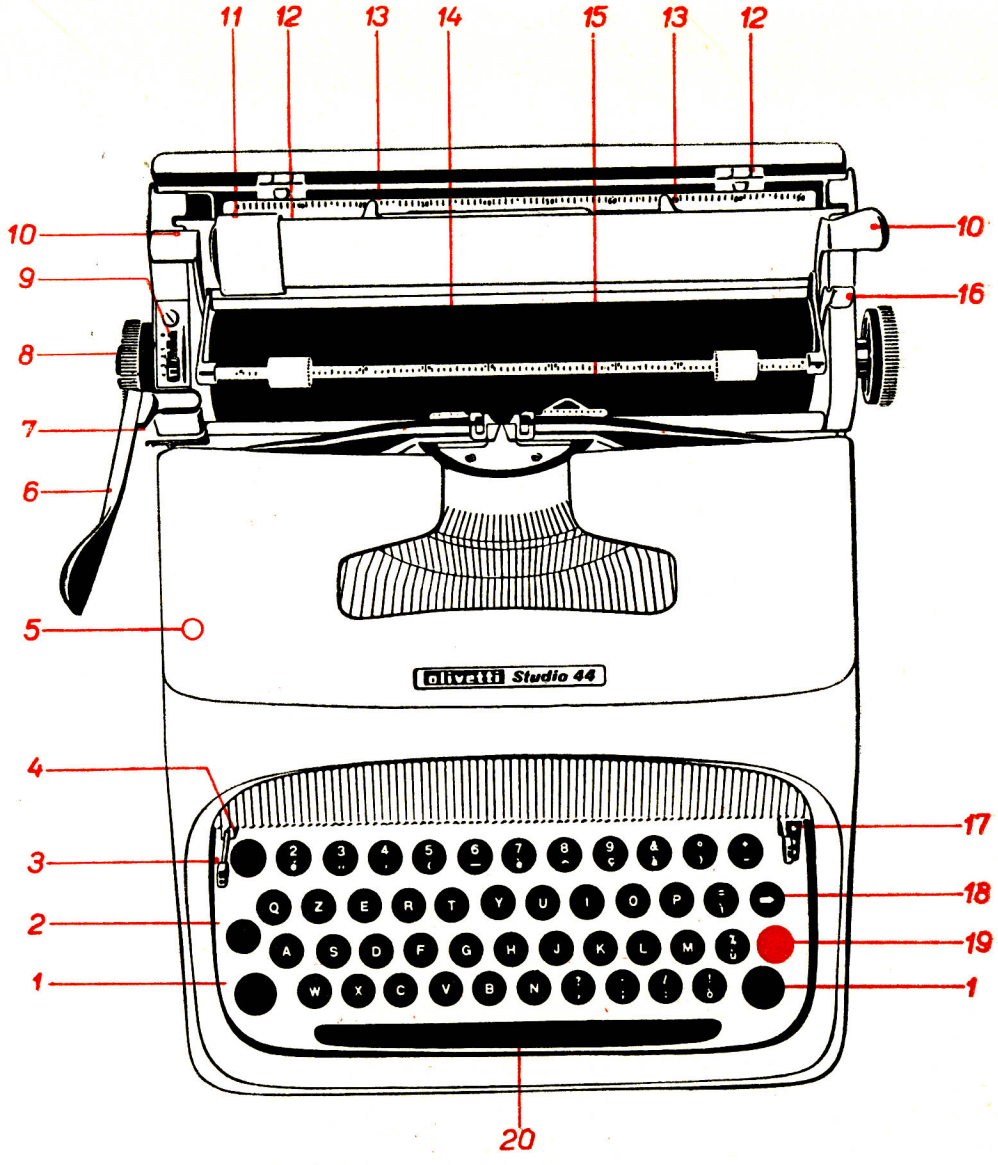
Movable segment.

The movable segment is provided with an anti-recoil device which locks it in the position for typing with small letters.

Technical data.

Weight of machine	6.850 kg.
Height	145 mm.
Width	330 mm.
Lenght	390 mm.
Diameter of platen	41.2 mm.
Maximum width of paper	248 mm.
Length of typed line	234 mm.
Number of spaces:	
2.6 mm. pitch	90
2.23 mm. pitch	105

Line spacing: 9.5 - Standard - Ruys' - English - Zurich 1
Spacing: 2.23 mm. - 2.6 mm.


11
12
13
14
15
13
12
10
9
8
7
6
5
10
16
olivetti Studio 44
4
3
2
1
17
18
19
1
20

OPERATION

Right and left are as they would appear on the machine when looking at it from a position facing the front of the machine.

Front and back of machine are where keyboard and carriage, respectively, are situated.

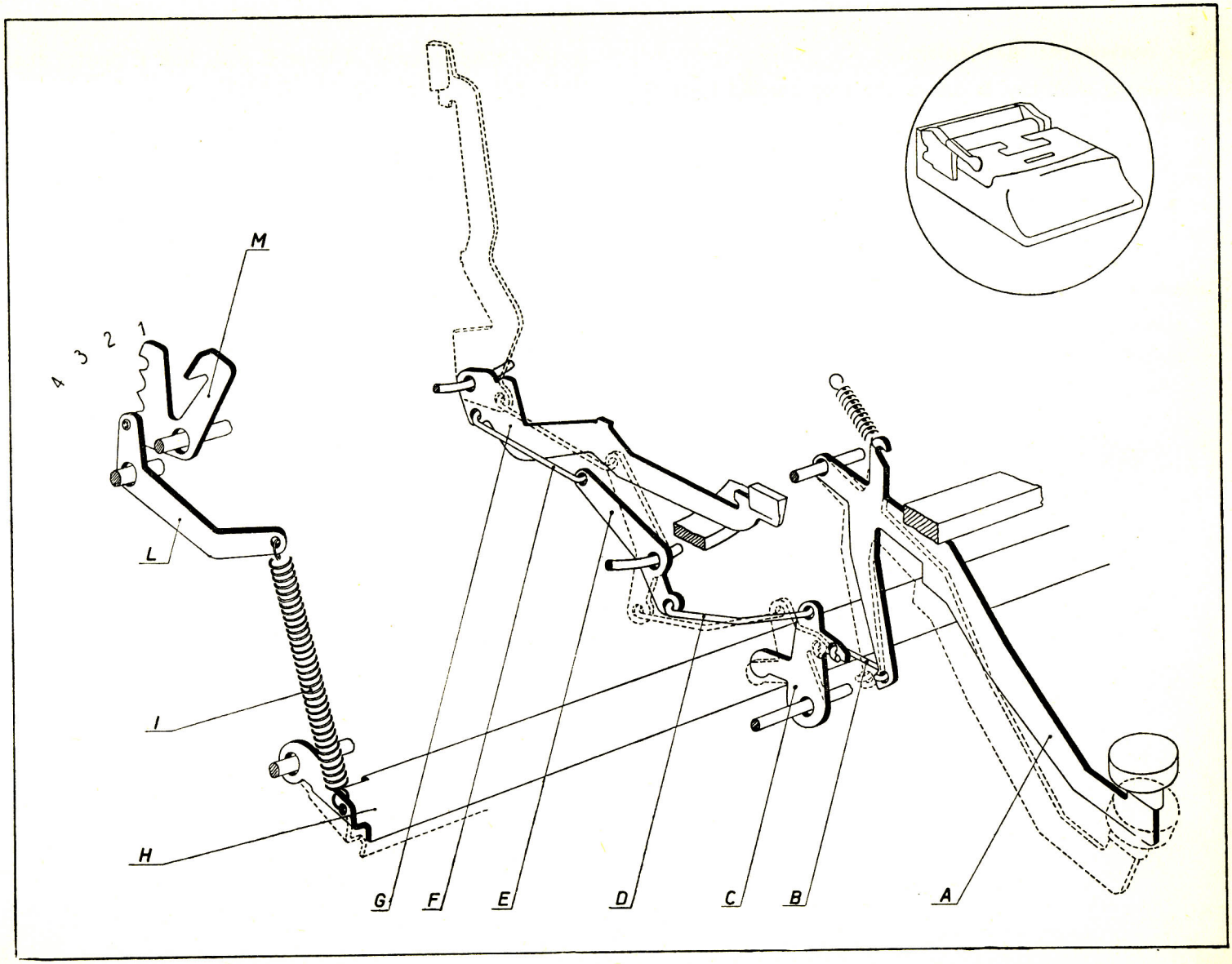
The full lines indicate parts in their position of rest, and the dotted lines show the positions reached at the end of their movement.

Cinematic and touch control.

When a key is lowered, the corresponding lever **A**, through link **B**, moves the first movement lever **C** towards the back. Lever **C**, by means of link **D**, causes the second movement lever **E** to turn towards the front. Lever **E**, by means of pull rod **F** raises type bar **G**.

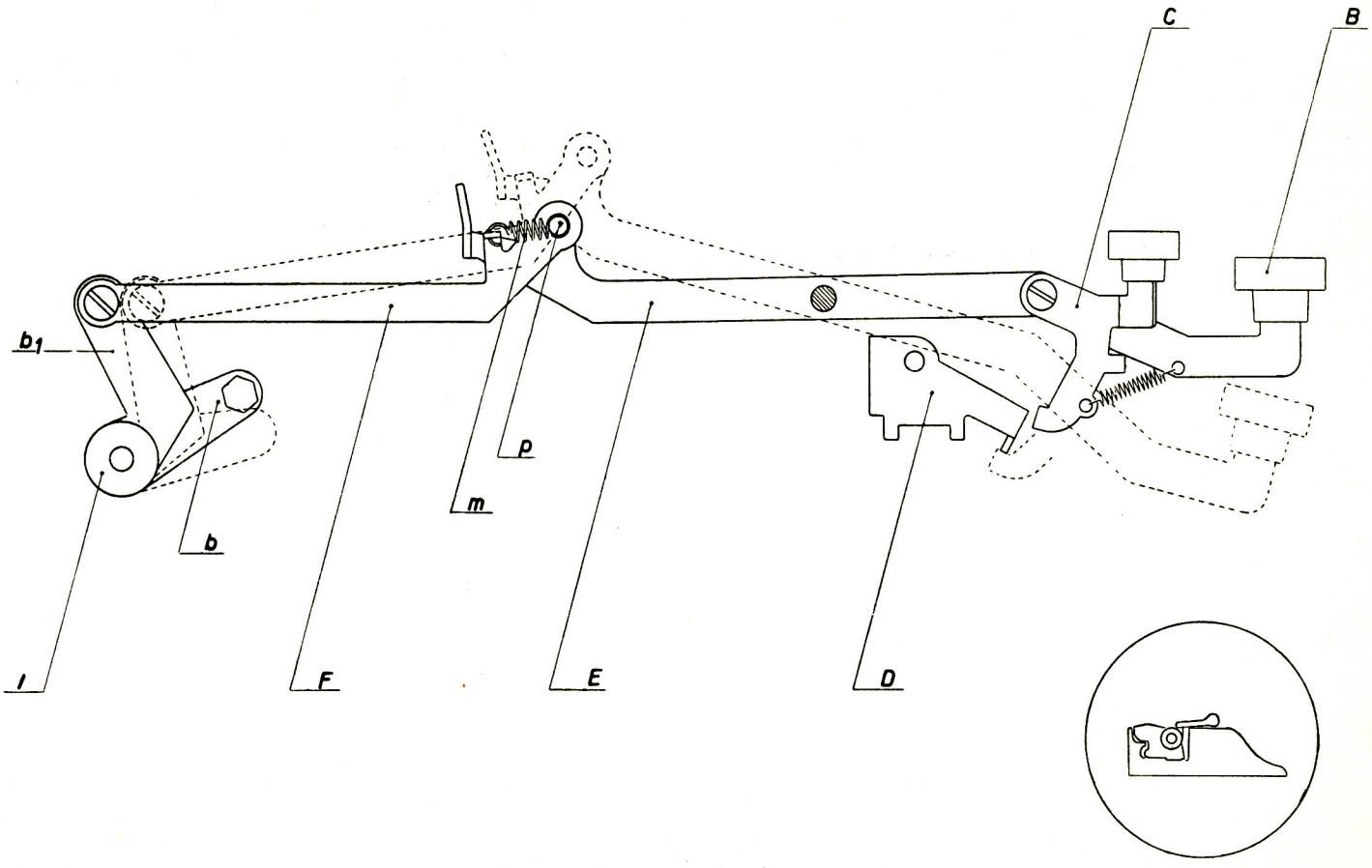
In its backward rotation, first movement lever **C** lowers lug **H** of the ribbon movement. The latter, through a mechanism which will be described later, determines the feed and lift of the ribbon.

A certain force, which is dependent on the tension of spring **I**, is required to lower lug **H**. Through lever **M** and corresponding arm **L**, four different tensions can be given to the said spring **I**. The force necessary to lower the keys can thus be varied and the touch adjusted to suit the operator.


M
4 3 2 1
L
I
H
G
F
E
D
C
B
A

Shift movement mechanism.

Lowering shift key **B** causes the rear part of lever **E** to lift. Displacement of lever **E** pulls link **F** causing the shaft with arm **I** to rotate forwards.


C
B
b1
p
m
b
l
F
E
D

Shift mechanism.

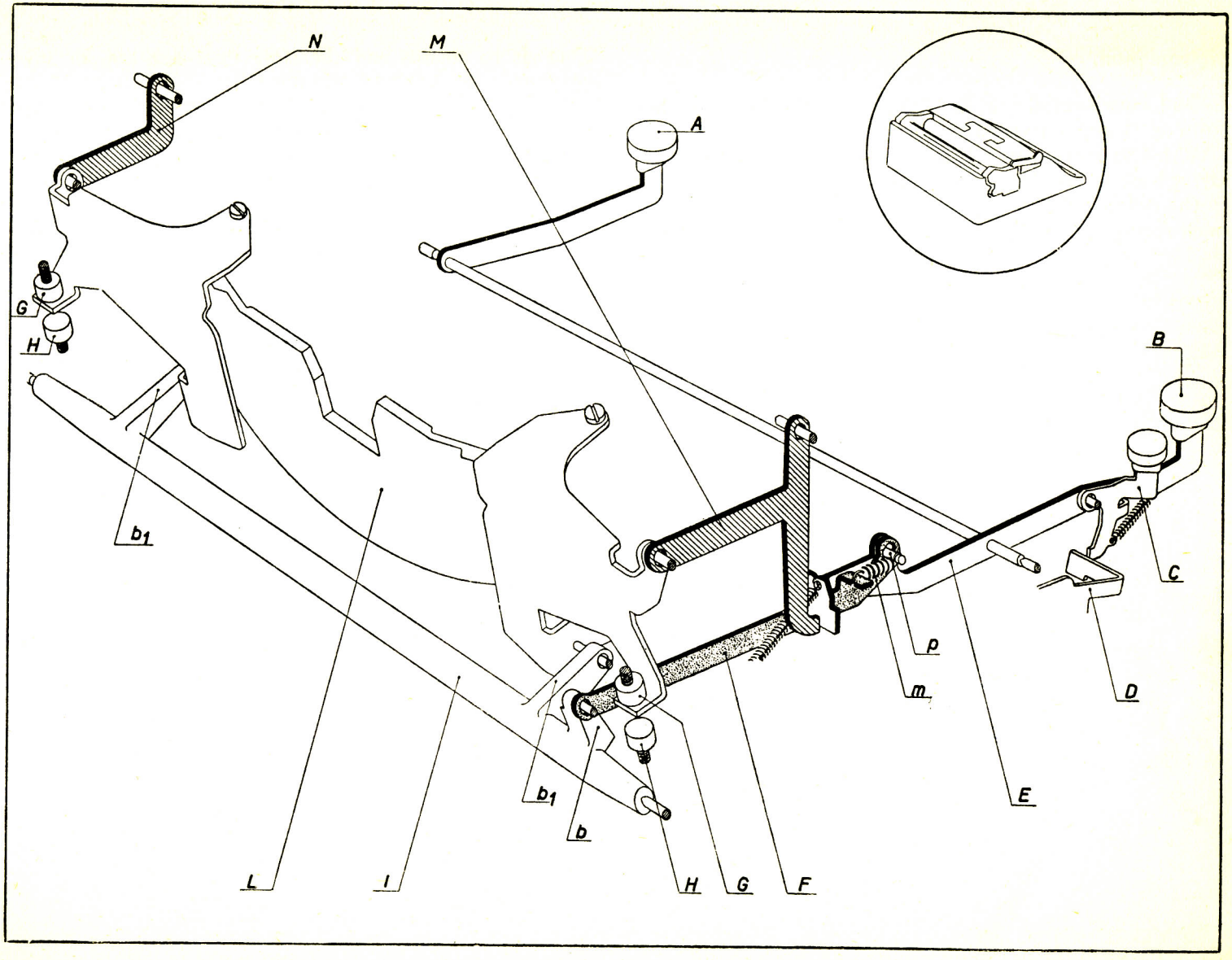
The type-bar segment **L** is pivoted on the two arms **b1** of shaft **I** and is consequently lowered.

The movement of the segment is stopped by regulator **H**, which determines the " capitals " position of the segment itself.

Connection between lever **E** and link **F** is by means of pin **p** which is lodged in the slot of the link itself. Spring **m** is hooked between the latter and lever **F**. This group constitutes the flexible coupling of the shift mechanism chain. When the type bar segment has reached the capitals position and the lowering of one of the two keys **A** or **B** is continued, the flexible coupling is brought into action. Shaft **I** remains steady while pin **p** slides in the slot of link **F**. Almost at the end of the operation, the lever of shift lock **C** can be hooked to the corresponding bracket **D**.

The connecting rod **M**, in addition to guiding the type bar segment, has also the function of locking it in its " small letters " position. In fact, its lower angle intercepts the rear bend of lever **E**.

It is only possible to lower the segment by depressing the shift key: in fact, any attempts made to lower the segment by direct pressure are opposed by blockage caused by intercepting pieces. The segment thus remains locked in its position.


N
M
A
G
H
B
b_1
C
p
m
D
E
b_1
b
L
I
H
G
F

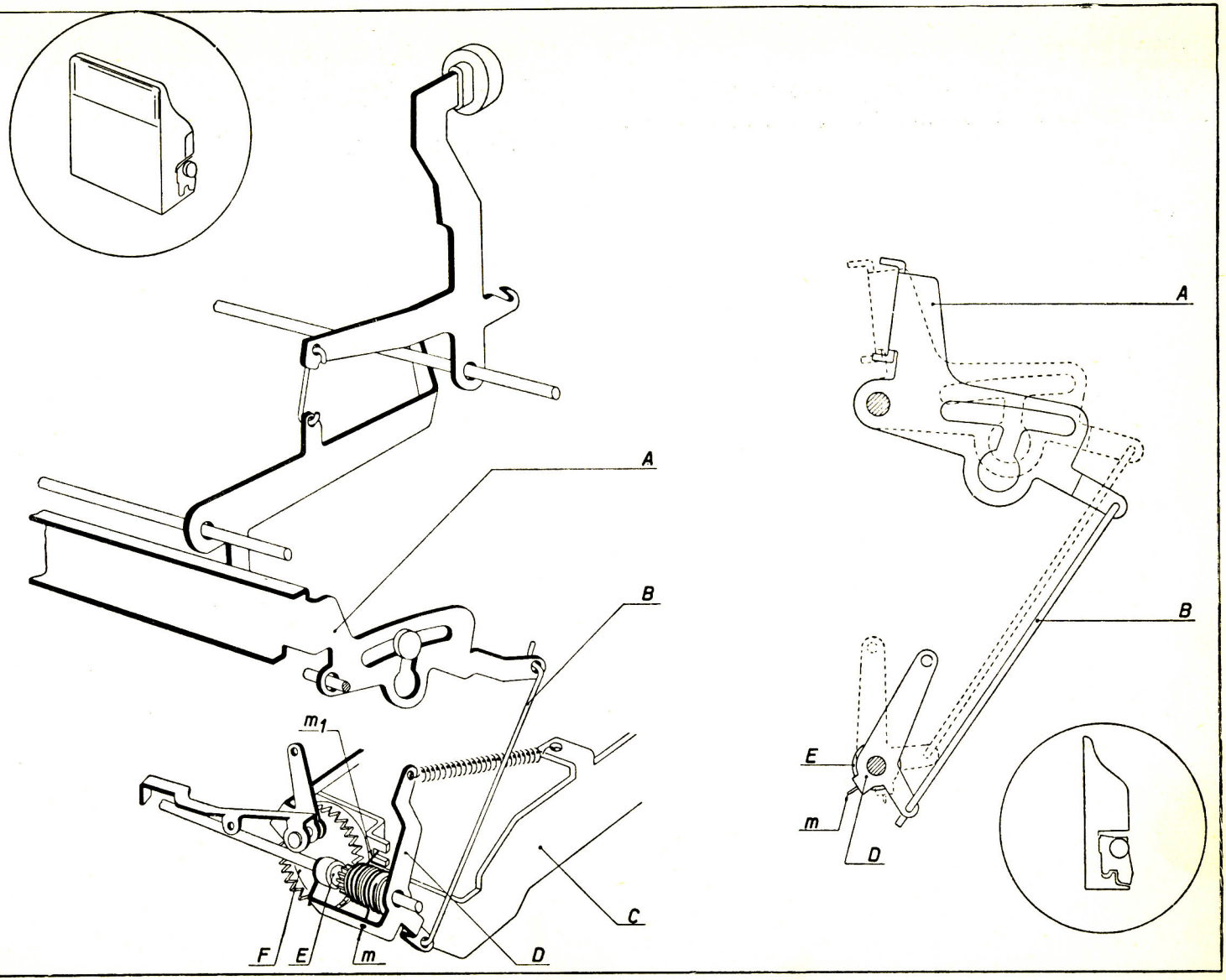
Ribbon feed.

The forward rotation of the ribbon operating lug through pull rod **B** causes frame **D** to turn in the same direction.

With this movement the small spring **m**, which has its spring head inserted in an opening of the frame **D**, tightens on the cylindrical part of pinion **E**, giving it rotation. The small spring **m1**, the head of which is anchored to bracket **C**, tends to stretch and therefore does not oppose any appreciable resistance to movement.

When the frame **D** returns to rest the small spring **m** tends to stretch and the slight dragging action against rotation in the opposite direction given by the pinion is immediately braked by small spring **m1** which tightens and holds pinion **E** steady.

The movement of the pinion itself is therefore always forwards.

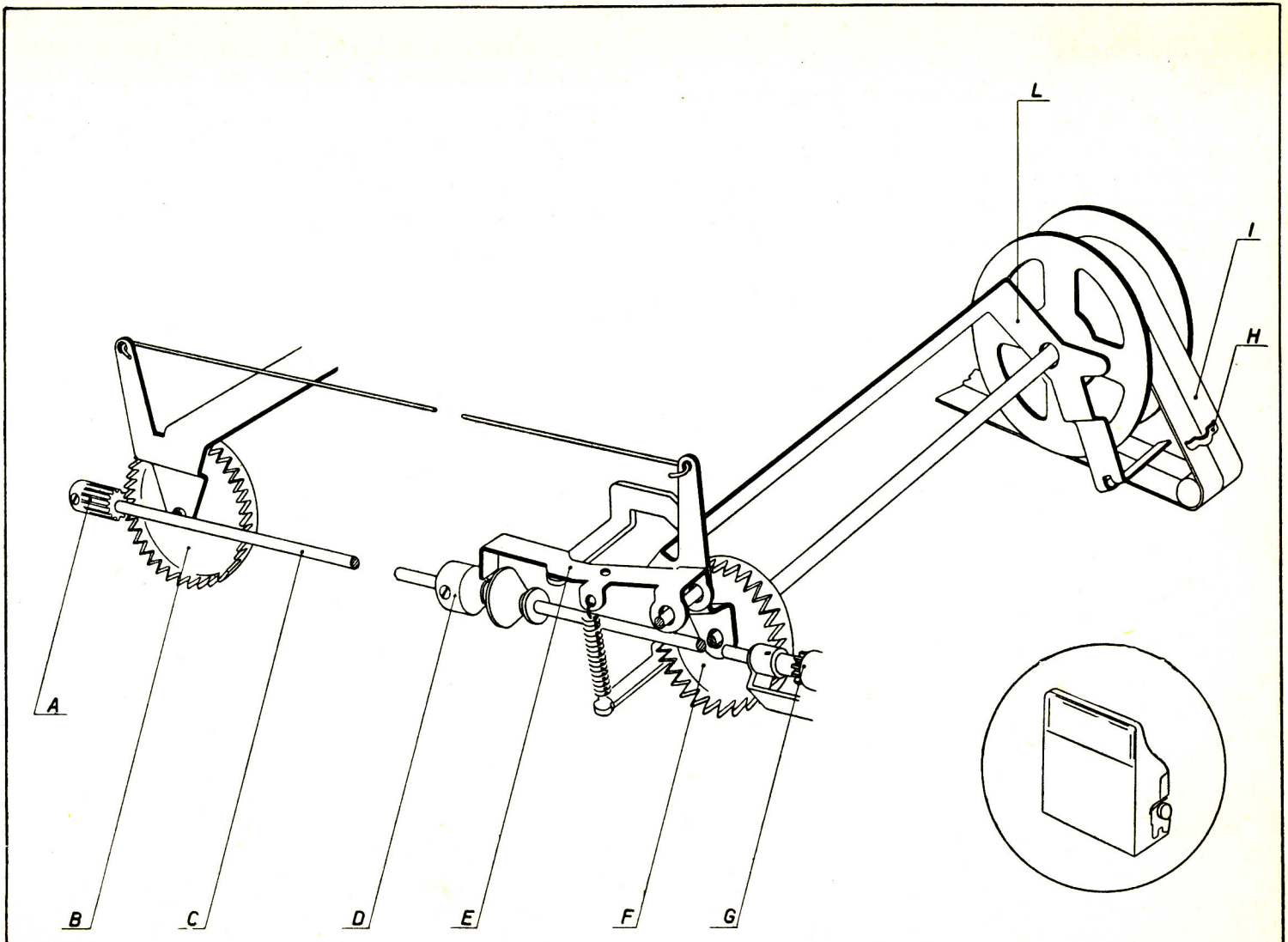

A
B
m1
F
E
m
D
C
A
B
E
m
D

Ribbon reverse.

The ribbon reverse is controlled by two hooks **H** which are attached to the two extremities of the ribbon itself.

The ribbon is pulled by the toothed wheel **B** (which makes the corresponding spool rotate and unwind the ribbon from the other which turns freely in neutral).

Shaft **C** is held in its position by cam **D** and the corresponding positioner **E.**


L
I
H
A
B
C
D
E
F
G

Reverse movement.

The illustration shown on the preceding page is represented in figure 1, but not in perspective.

Continuing the advance of the feed, the ribbon **I** carries hook **H** to strike against lug **L** which drags positioner **E** along in its movement. The latter would, in the normal way, move shaft **C** to the right but this movement is prevented by pinion **G** on the right side of the machine.

Consequently positioner **E** rises along the inclined plane of cam **D**, descending on the next one of the right hand groove.

Shaft **C** is therefore pushed towards the left; pinion **A** disengages from wheel **B** while pinion **G** meshes with wheel **F** (fig. II). The latter causes the other spool to turn and to wind the ribbon back on itself.

fig. I

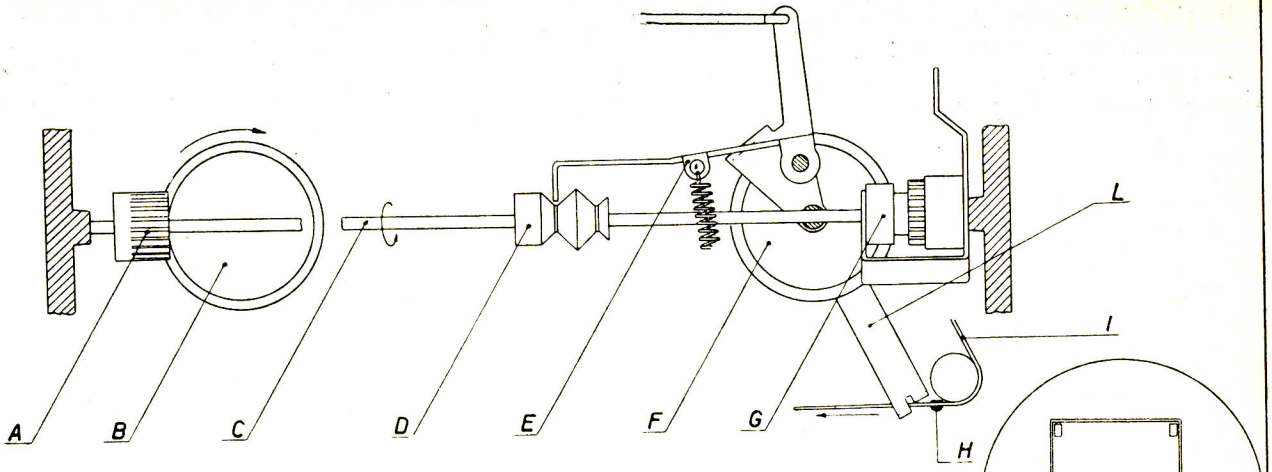
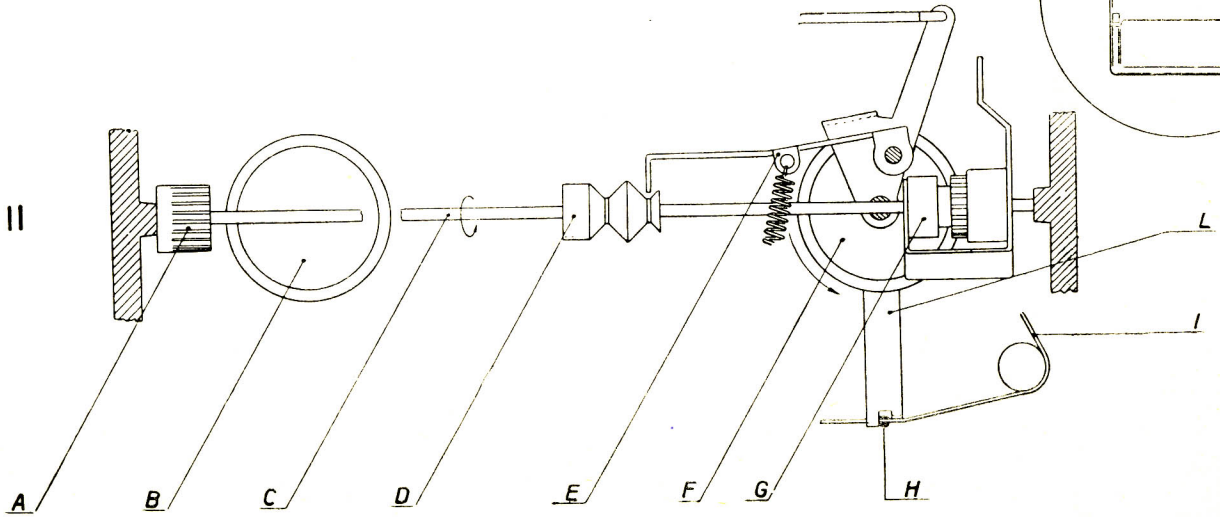


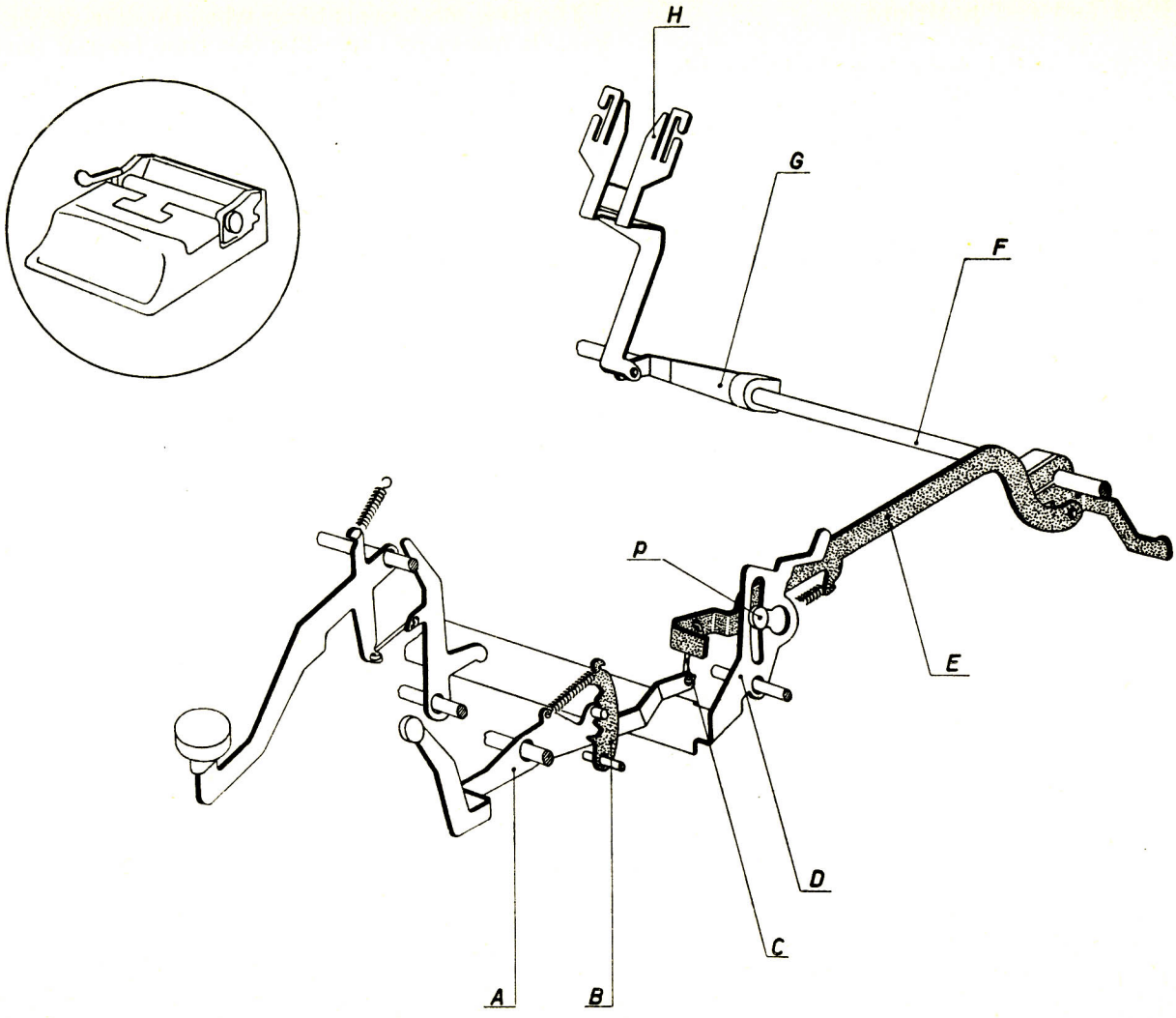
fig. II



Two-colour - Stencil (neutral) position.

In the illustration the entire two colour mechanism is shown in the neutral position.

In the middle position, the two-colour switch lever **A**, through pull rod **C**, places pin **p** of connecting rod **E** in coincidence with the horizontal slot made in the right side of the ribbon operation lug **D**. When the latter (impelled by a first movement lever) is lowered, it does not, however, drag connecting rod **E** along in its movement because pin **p** merely slides in the horizontal slot of the lug.


H
G
F
P
E
D
C
A
B

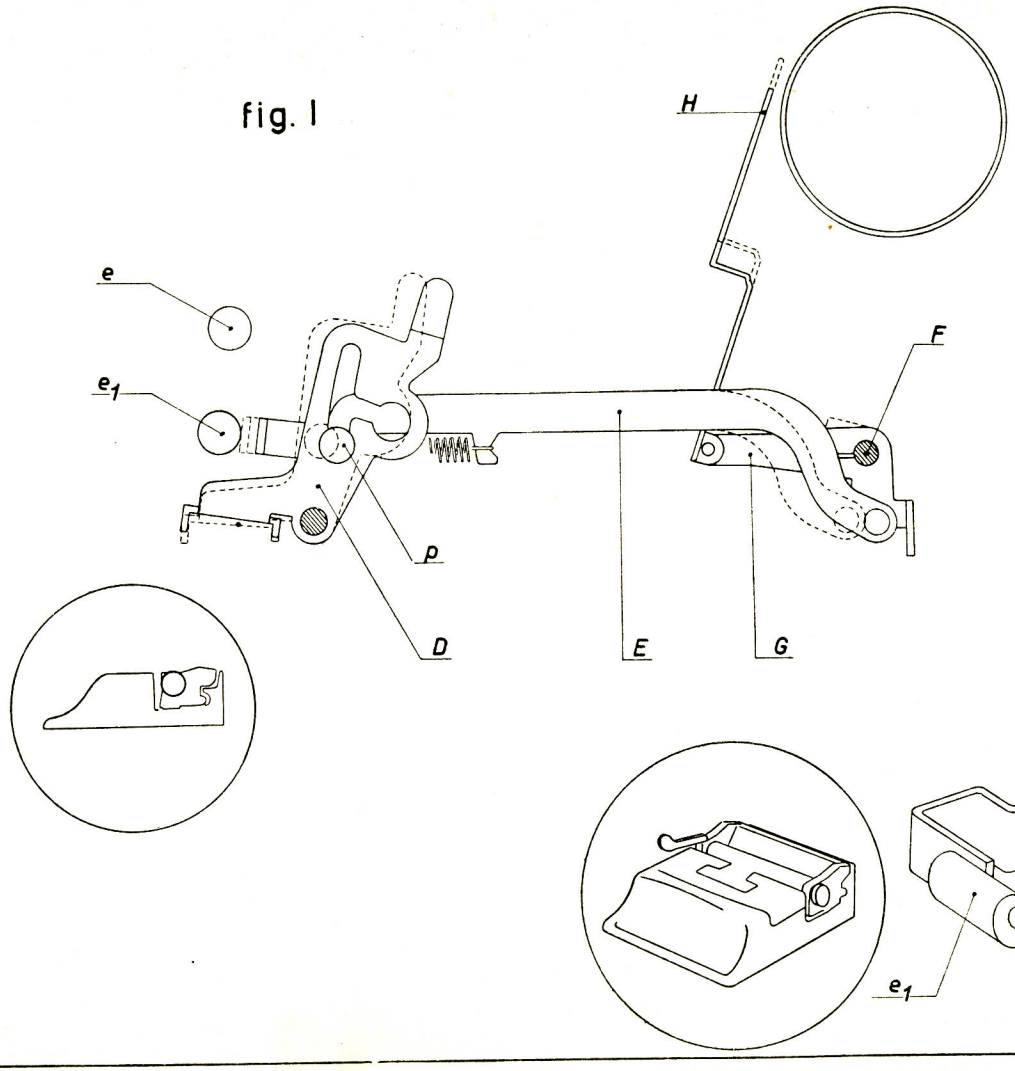
Two-colour - Blue and red positions.

When the two-colour switch lever is pushed upwards (position for blue), pin **p** of lever **E** sets itself into the position shown in figure 1. Lug **D**, as it is lowered, pulls lever **E** which makes shaft **F** rotate causing crank **G** to turn. The latter raises the ribbon carrier **H** which brings the ribbon into position for typing in blue. Lever **E** stops against eccentric **e1** (attached to the right side of the machine) and causes the upward movement of the ribbon carrier.

The same movements occur when the two-colour switch lever is placed on red. But this time lever **E** is stopped by eccentric **C**.

When the lever **E** stops against eccentrics **e** or **e1**, the ribbon operating lug **D** has not quite completed its thrust. To overcome this the flexible coupling shown in figure II has been devised. Pin **p** is attached to counter lever **X** which can slide on lever **E**. When the latter is arrested, the lug, continuing its rotation, continues to move pin **p** which slides along the slot of the same lever **E**, at the same time overcoming the resistance of spring **m**.

fig. I



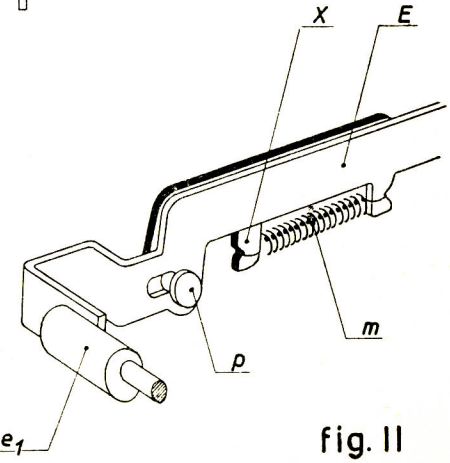


fig. II

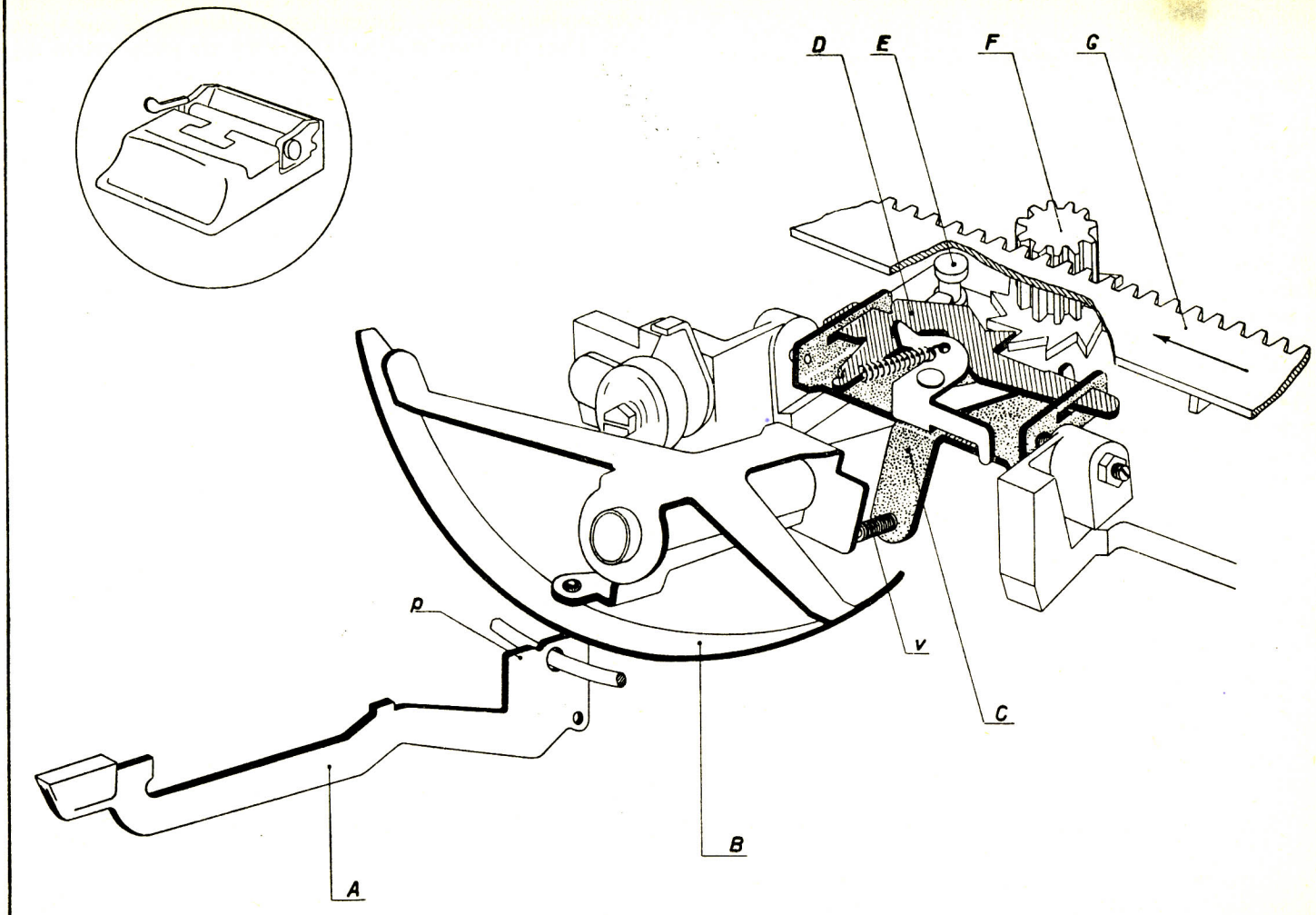
Trip.

Rack **G** fixed to the movable carriage guide is always meshed with the pinion of the escapement wheel **F**.

The movable guide is pulled to the left by the main spring operating through the agency of the carriage draw-wire.

In the rest position movable tooth **D** is meshed with escapement wheel **F** and therefore the carriage is stationary.

When a type bar **A** is raised, its profile **p** pushes against the back of universal frame **B**. This strikes against screw **v** of the rocker **C**, causing it to rise. The movable tooth **D**, following the movement of the rocker **C**, frees itself from the escapement wheel **F**, thus causing the carriage to trip.


D
E
F
G
p
v
C
B
A

Rocker movement.

The complete sequence of the rocker movements will now be explained in detail.

a) When at rest (see figure 1) the rocker **C** is supported on regulator **E**; its fixed tooth is not meshed with the teeth of wheel **F**, but is given a minimum clearance. In figure 1, for the sake of clarity, the movable tooth, which at rest is meshed with wheel **F**, has not been shown;

b) When rocker **C** is raised, the movable tooth frees itself from wheel **F**. The movable guide, pulled by the main carriage spring, moves to the left. Wheel **F**, however, comes into mesh with the fixed tooth (figure II) on which the tooth shown shaded comes to rest.

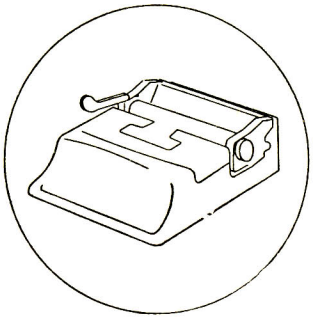
c) When the rocker **C** returns to rest, the movable tooth which follows its movement, engages the succeeding tooth of the escapement wheel. The carriage has moved one space.

As explained above, the carriage movement of one space takes place in two stages. Contrary to what might be imagined, the printing does not occur between the first and second stage. Actually, since the type-bar travels with a remarkably high speed and operates the universal frame when it is very close to the platen, the printing is accomplished even before the carriage has started to move.

This system guarantees the greatest uniformity in the spacing and speed in the typing.

Silencer.

Figure III shows the operation of the silencer finger **G**. When the carriage moves from left to right the escapement wheel **F** rotates counter-clockwise. The finger is dragged by the movement and keeps movable toothi **D** away from the wheel. Without this provision, movable tooth **D** would bounce from one tcoth of the wheel to the other, producing a continuous metallic sound.



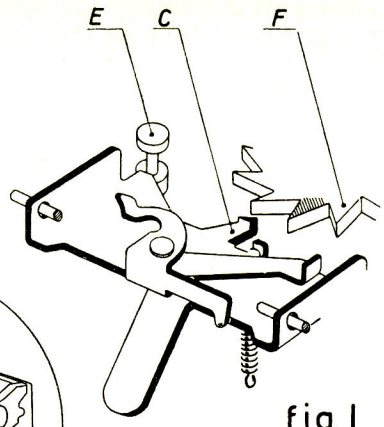


fig. I

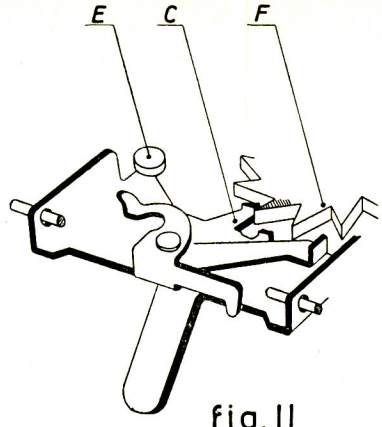


fig. II

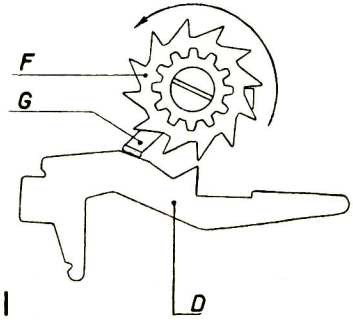
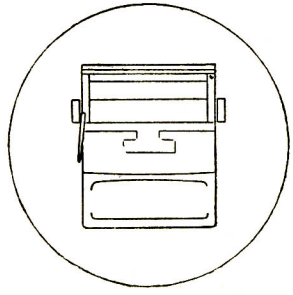


fig. III

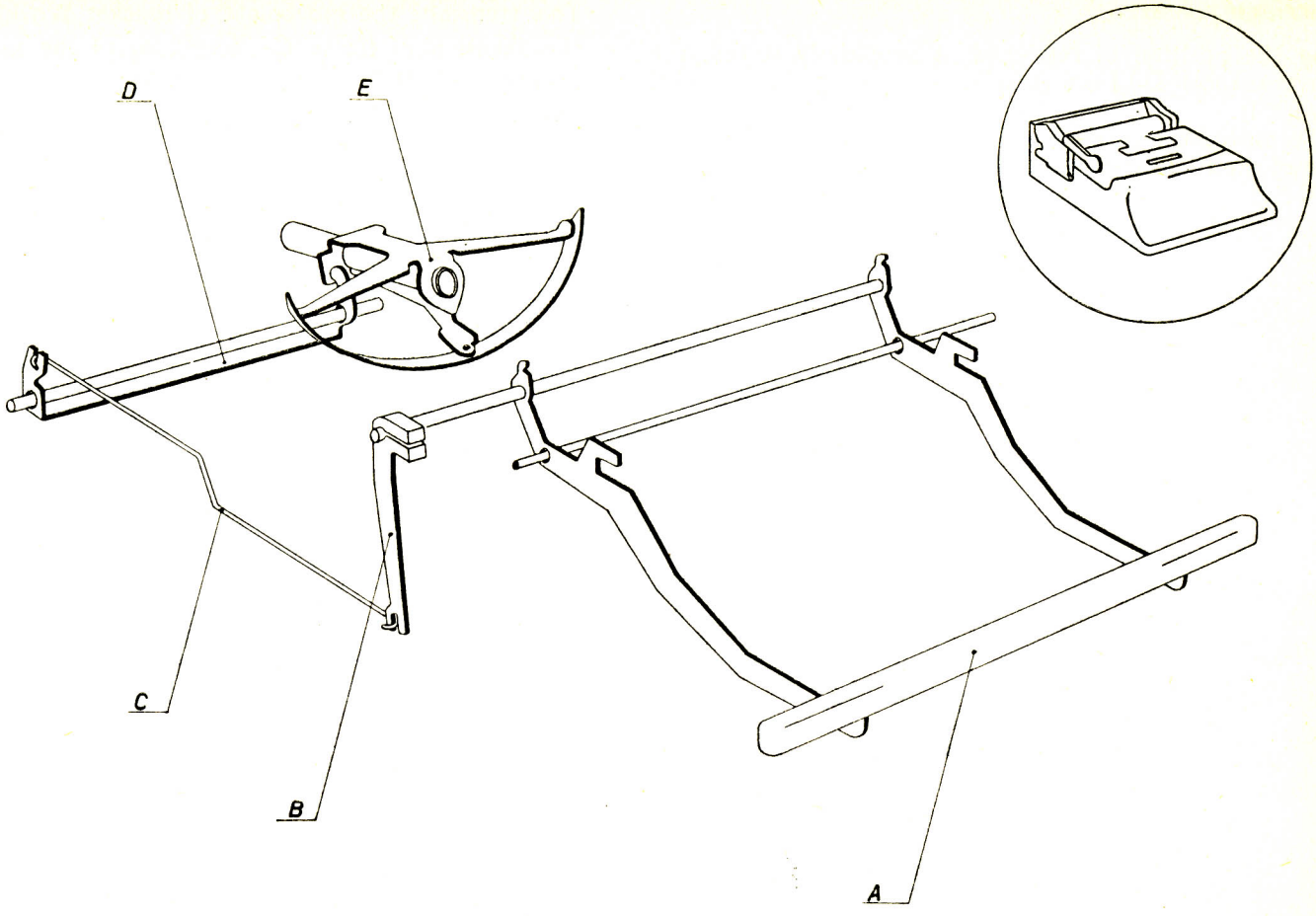


Space bar.

When the space bar **A** is lowered, lever **B** turns and moves link **C** towards the rear of the machine.

This movement is transmitted to frame **D** which presses with its right hand shank against universal frame **E**.

The latter, as previously explained controls the carriage release.


D
E
C
B
A

Carriage release.

In the position of rest, and as previously stated, the movable tooth **D** of the escapement is engaged in wheel **E** (figure I).

To enable the carriage to run freely from right to left, one of the two carriage release levers **A** must be lowered.

This transmits the movement of bracket **B** which moves the shank **a** of frame **C**. Shank a_1 of the same frame moves tooth **D** forward, disengaging it from escapement wheel **E** (figure II).

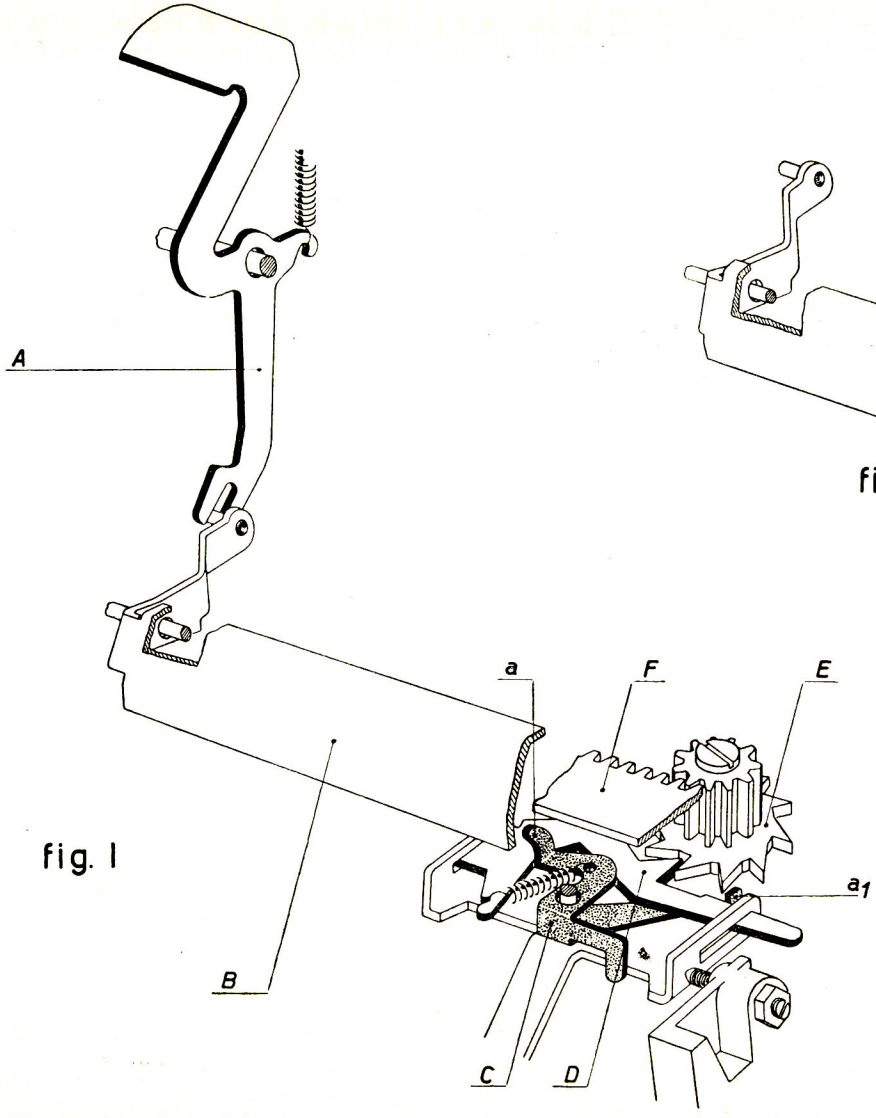


fig. I

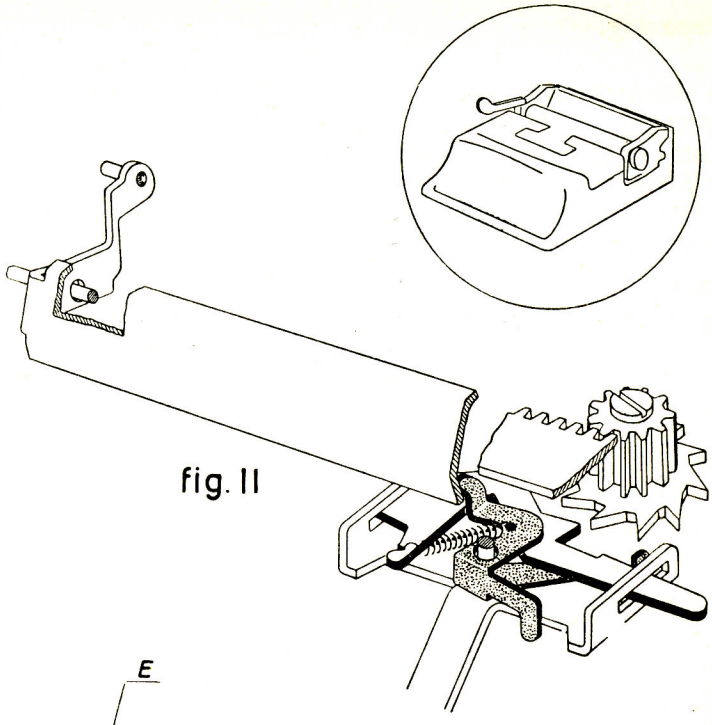


fig. II

Back spacing.

When the back space key is lowered (figure I), the corresponding lever **A**, through link **B**, causes lever **C** to turn and drag pull rod **D** forwards. The latter makes frame **E** rotate counter-clockwise moving pawl **F** to the left. The latter meshes with escapement wheel **G**, causing it to turn backwards one space.

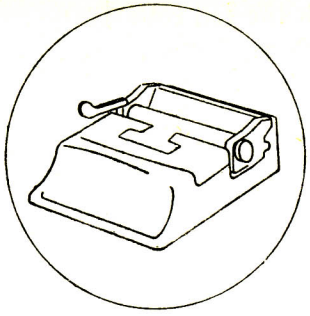
How this movement occurs:

a) When at rest (position in figure II), pawl **F** is clear by a small amount from escapement wheel **G**;

b) In its path to the left, pawl **F** meshes with the shaded tooth of wheel **G**; the latter is consequently forced to rotate counter-clockwise. The movable tooth **X** frees itself from wheel **G** which with one of its teeth drives it towards the front (figure III);

c) As soon as pawl **F** returns to rest, movable tooth **X** is ready to engage the following tooth of wheel **G**. The latter, with the rack, and therefore also the movable guide, is moved backwards one space.

N. B. - The second tooth **d1** of the pawl **F** (figure III) prevents the escapement wheel jumping two spaces instead of one.



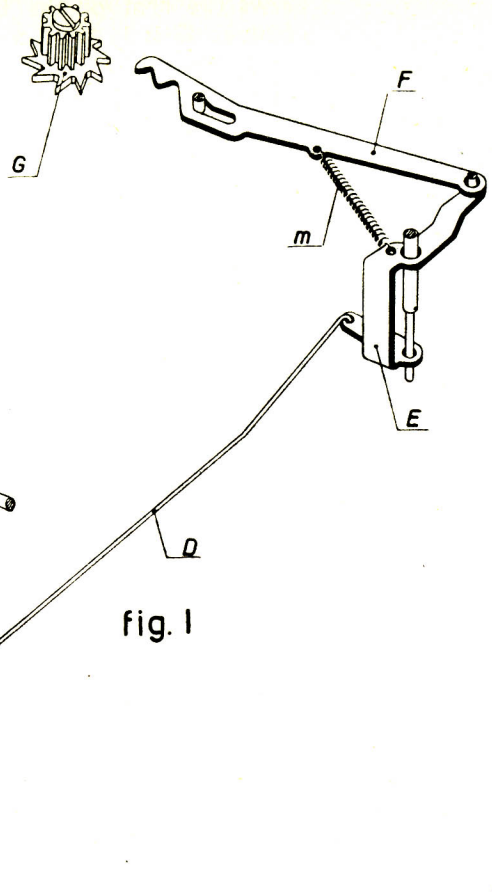
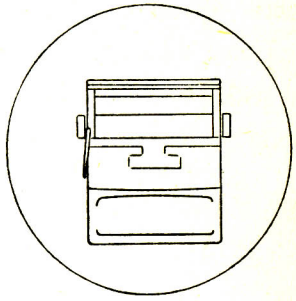


fig. I



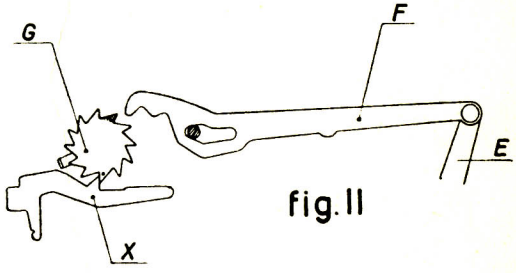


fig. II

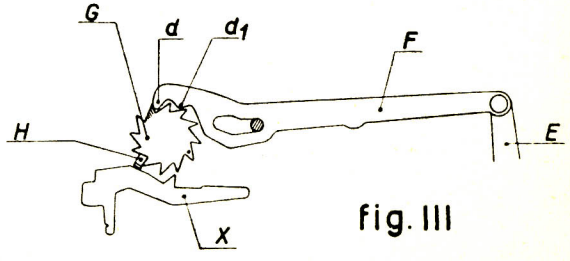


fig. III

Tabulator.

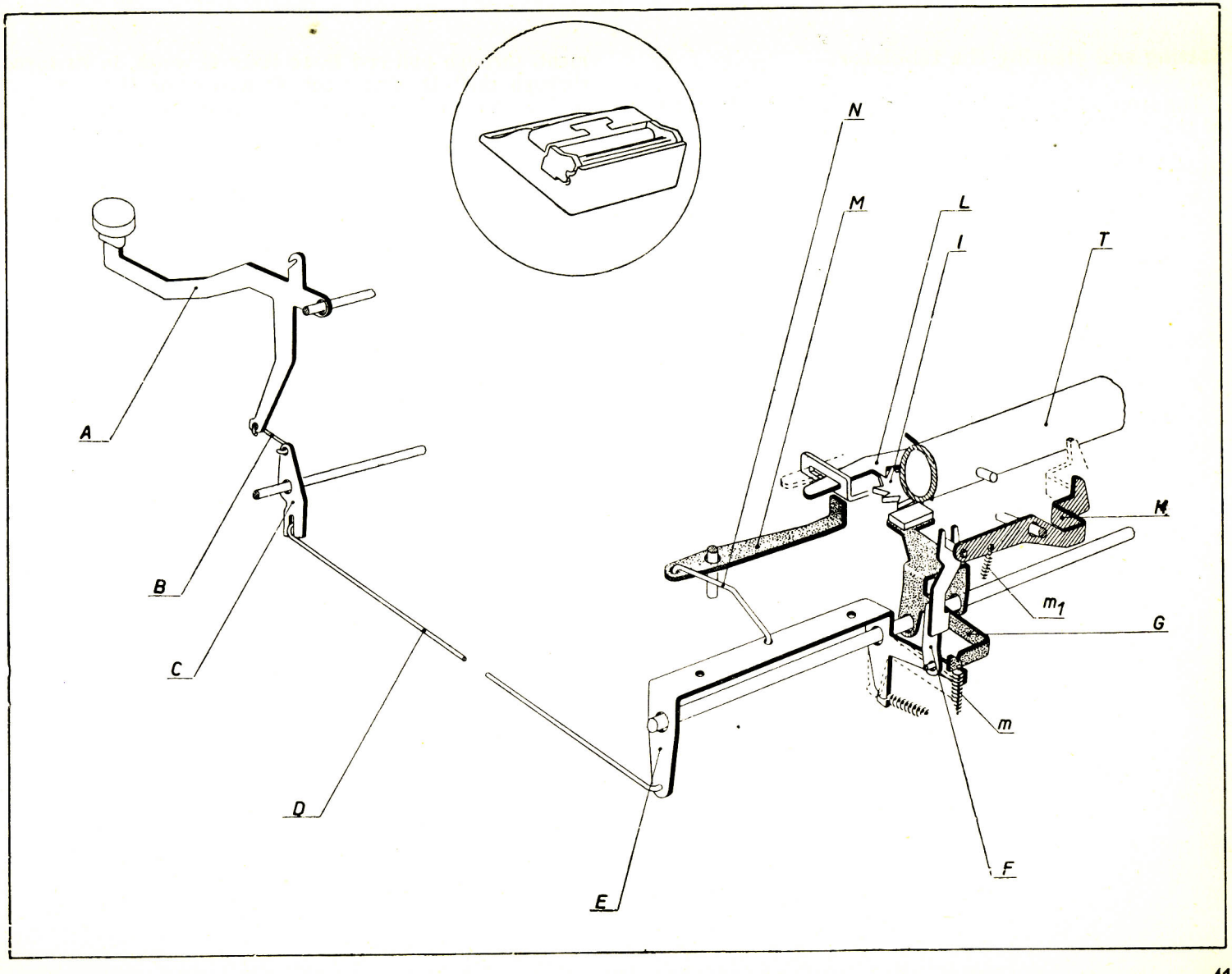
When the tabulator key is lowered, the corresponding lever **A**, through link **B**, causes lever **C** to turn. The latter, through pull rod **D** makes bridge **E** rotate.

Three different movements take place:

a) The rear arm of bridge **E** is lowered. Spring **m** draws the arm of the brake **G** downwards. The cork of brake **G** is in contact with the rail tube **T**.

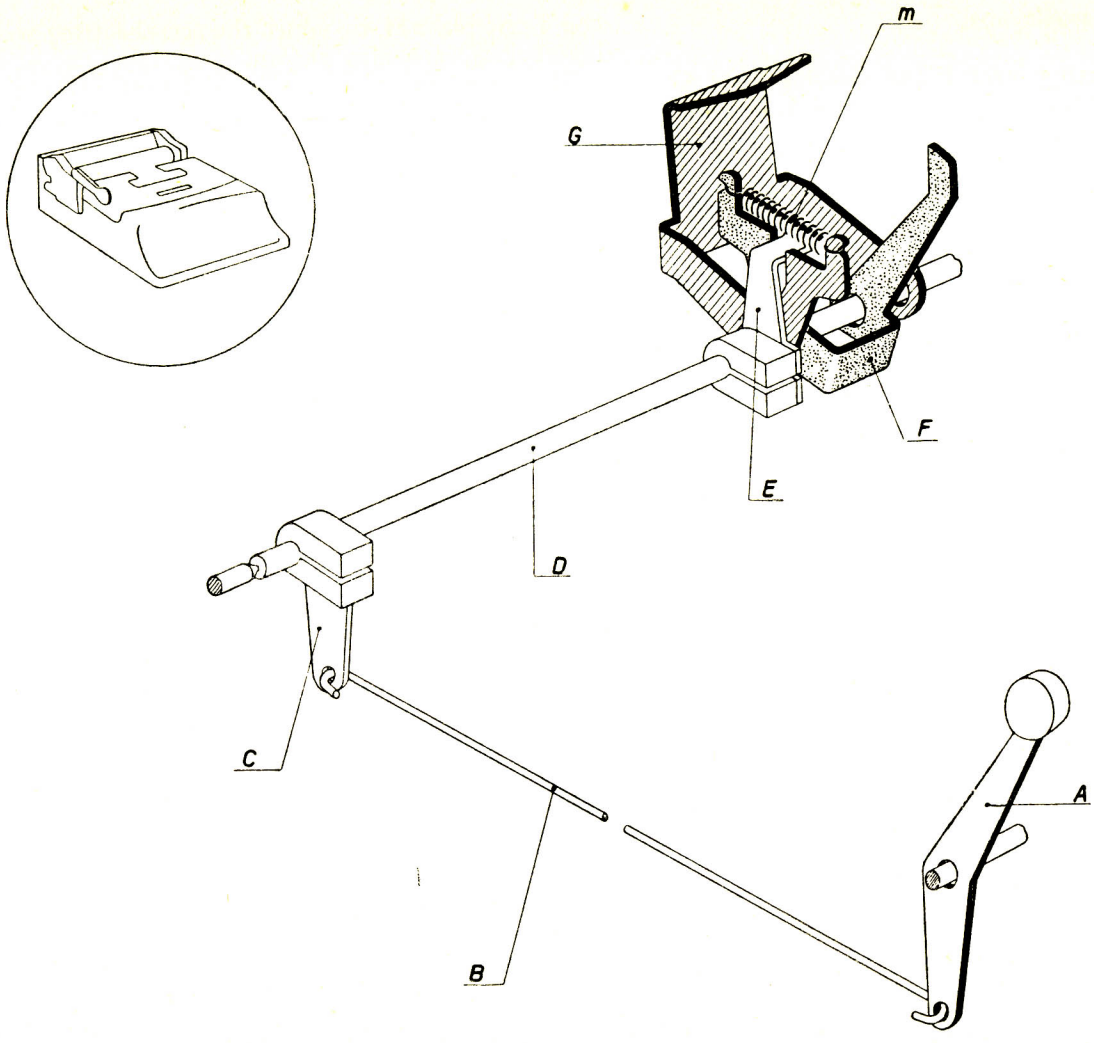
b) The same arm pulls lever **F** downwards. Spring **m1** pulls back stop **H**, the left extremity of which takes up a position to intercept the stop set.

c) At the same time, bridge **E** moves pull rod **N** which transmits the movement to lever **M**. The latter disengages the movable tooth from the escapement wheel, releasing the movable guide which can then start moving.


N
M
L
I
T
A
B
C
D
E
F
H
m1
G
m

Setting and clearing the tabulator.

The stops of the tabulator are set and cleared by means of the small control lever **A**. This transmits the movement, through pull rod **B**, to lever **C** which, in its turn, through shaft **D**, sets crank **E** in rotation (forwards or backwards). The latter, on account of its lateral shank, makes setting lever **F** or clearing lever **G** operate.


m
G
F
E
D
C
A
B

Setting and clearing positions.

Shaft **D**, crank **E**, setting lever **F** and clearing lever **G** are shown in their positions of rest in figure 1, but not in perspective. In addition the tabulator stop carrying rod **T** and plate **H**, on which the actual setting and clearing levers rest, are also shown.

The positions taken up by different parts during the setting and clearing operation are indicated in figures II and III.

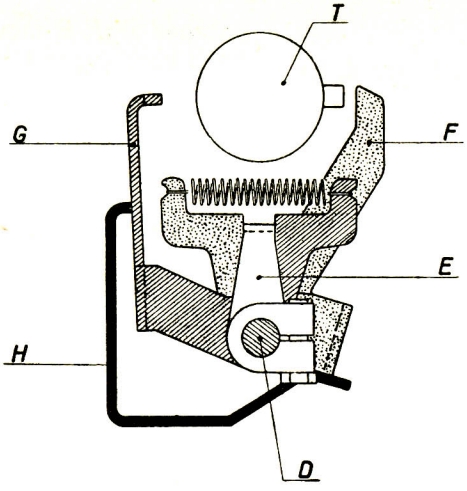
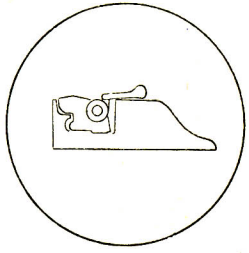


fig. I



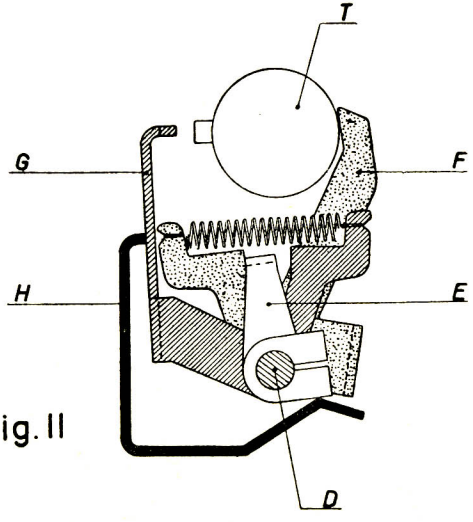


fig. II

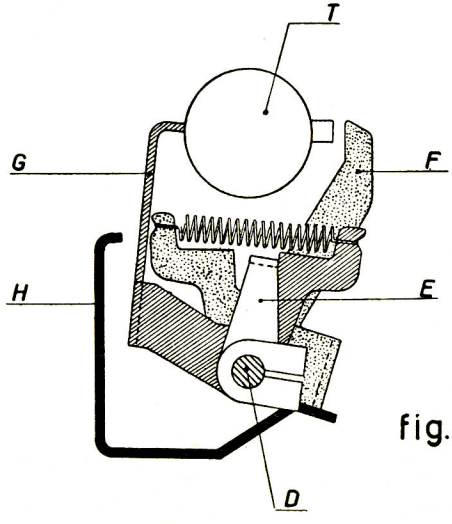
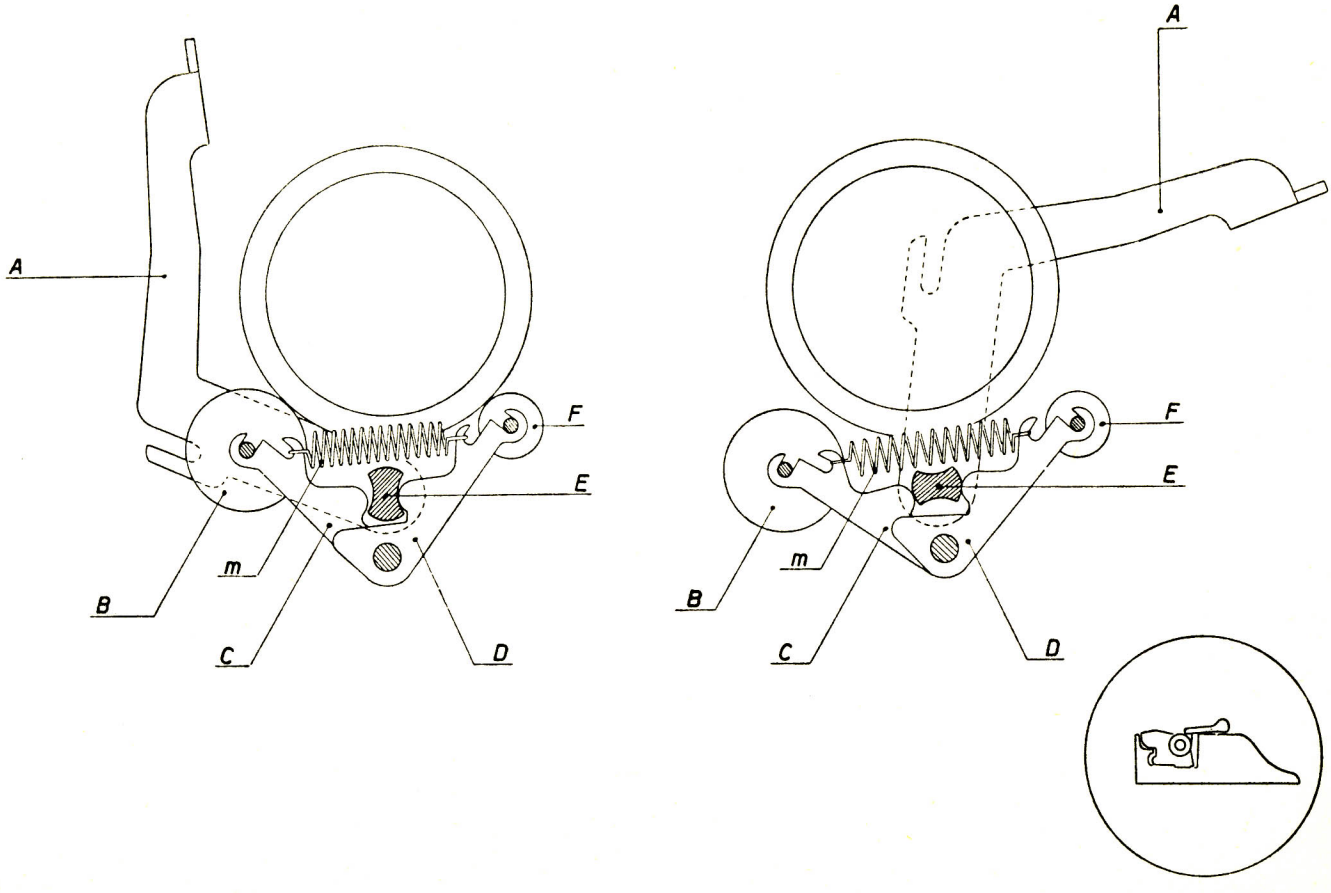


fig. III

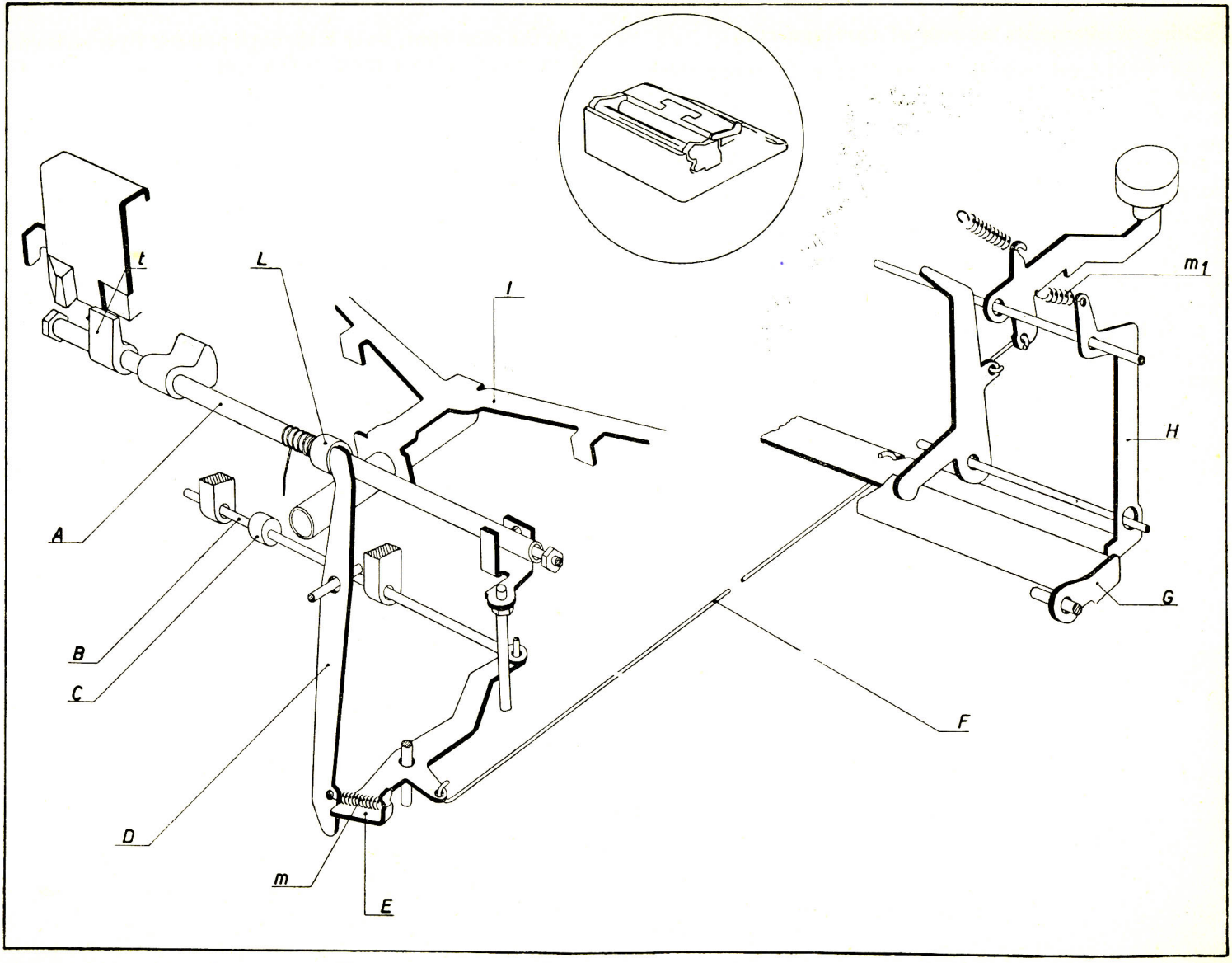
Paper release.

When the paper release lever **A** is moved forward, its shaped shaft **E** moves brackets **C** and **D**, raising the front and back paper feed rolls **B** and **F** away from the platen.


A
F
E
B
m
C
D
A
F
E
B
m
C
D

Margin setters and line locks.

In the figure the margin rod **A** is shown in its position of rest held by spring **m1** of lug **H**. The two locking systems are shown in the same figure; one on the universal frame (levers **D** and **E**, shaft **B** with its eccentric **C**) the other on the ribbon operating lug **G** (levers **D** and **E**, pull rod **F** and frame **H**). Both locking devices are in their positions of rest.


t
L
I
m1
H
A
B
C
D
m
E
F
G

Locking movements at end of carriage run.

The right-hand margin setter (figure I) approaching tenon **t** of the margin rod **A**, operates the bell which gives audible warning that the carriage is approaching the limit of its run.

Subsequently the margin setter strikes tenon **t**, pulling along with is shaft **A** which is stopped against the support nut on the left. The carriage stops. In order to prevent typing whilst the carriage is stationary, two locking devices are brought into action. In its movement, release shaft **A**, by means of collar **L**, causes lever **D** to turn; the latter, through spring **m**, pulls lever **E**.

Shaft **B** moves and its eccentric **C** reaches a position, in relation to the universal frame **I**, such as to prevent further movement of the latter.

At the same time, lever **E** through pull rod **F** places frame **H** in position to intercept the ribbon operating lug **G** (figure II). The keyboard is thus locked.

N. B. The coupling between levers **D** and **E** is flexible (spring **m**), and the reason for this is the following: if the displacement of shaft **B** had taken place when the universal frame had not reached the rest position, it would have fouled eccentric **C**. With the device provided, this cannot take place. Actually, if universal frame **N** is not at rest, shaft **B** cannot move and lever **D** would stretch spring **m**. When the shaft is at rest, the spring is relieved, carrying the eccentric **C** to a position which intercepts the path of the frame itself.

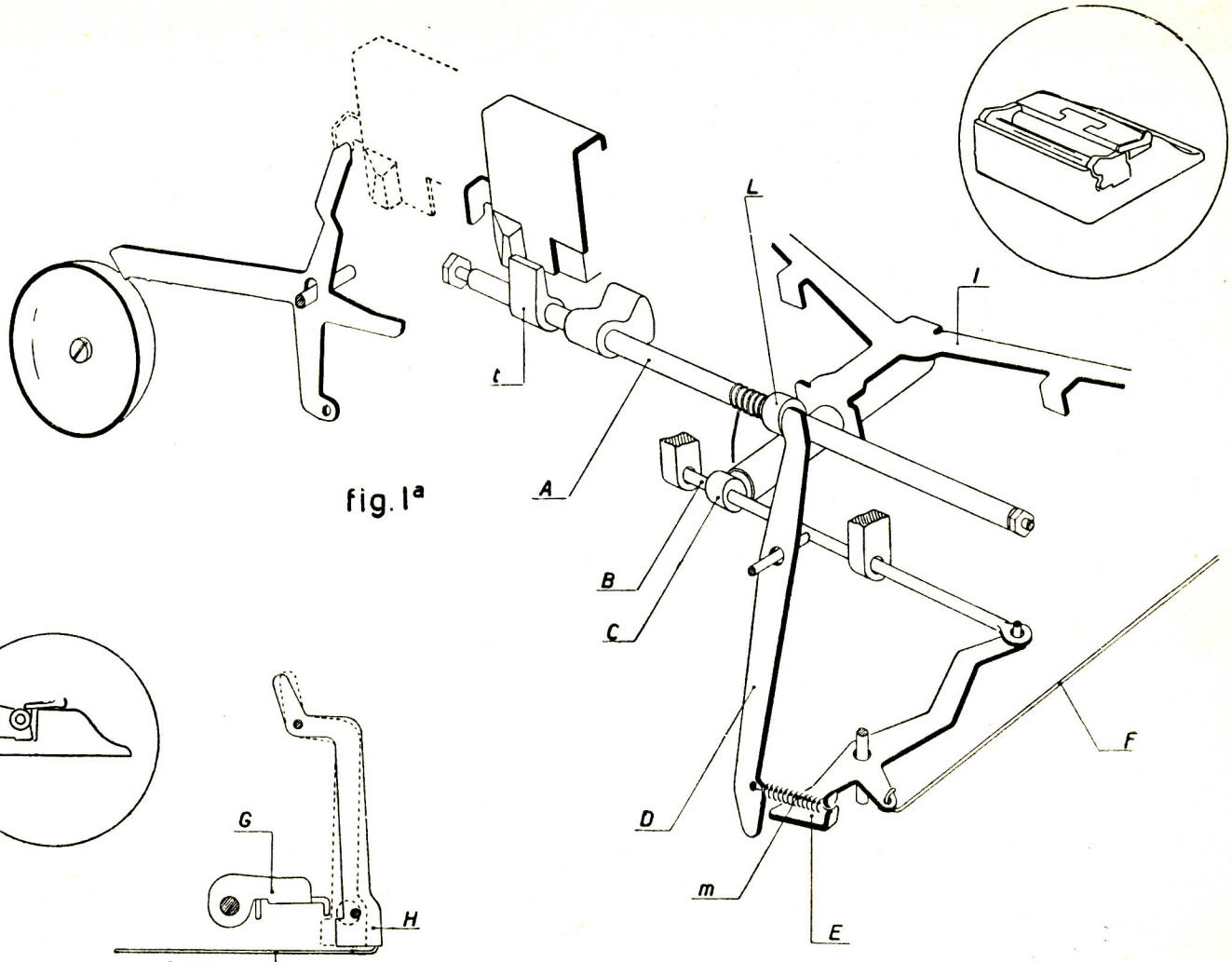


fig. I[a]

fig. II[a]

Margin release.

Whenever it is desired to continue typing beyond the point predetermined by the right hand margin setter, the margin release key **P** must be depressed (figure I). The link **O**, moved backwards, causes square **N** to turn and raise shaft **M**. The latter, through its upper fork in which is lodged a pin of the release shaft **A**, causes the shaft to rotate backwards. Thus the tenon **t** is freed from the margin setter; the locking mechanism returns to the position of rest and typing can be continued.

Naturally, carrying out the same operation, the left hand margin setter can also be passed over.

Indentation.

To indent the beginning of a line with respect to the margin set, it is only necessary to lower the margin release key before moving the carriage from left to right.

The release shaft, as already shown, rotates only slightly. Thus the left-hand margin setter is no longer stopped by the tenon **t** but by tenon **t1** which stops the carriage a given number of spaces before the margin normally set (figure II).

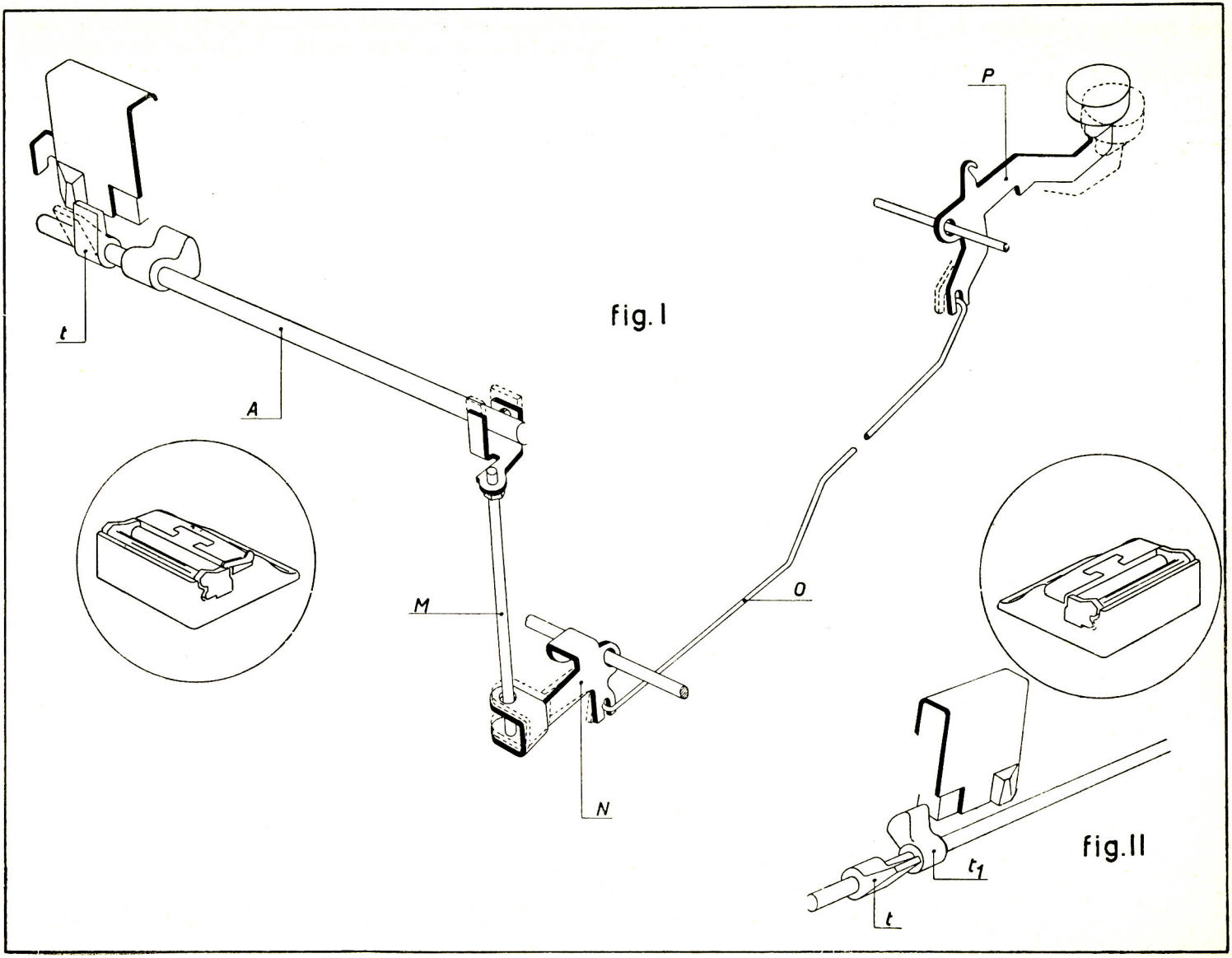


fig. I

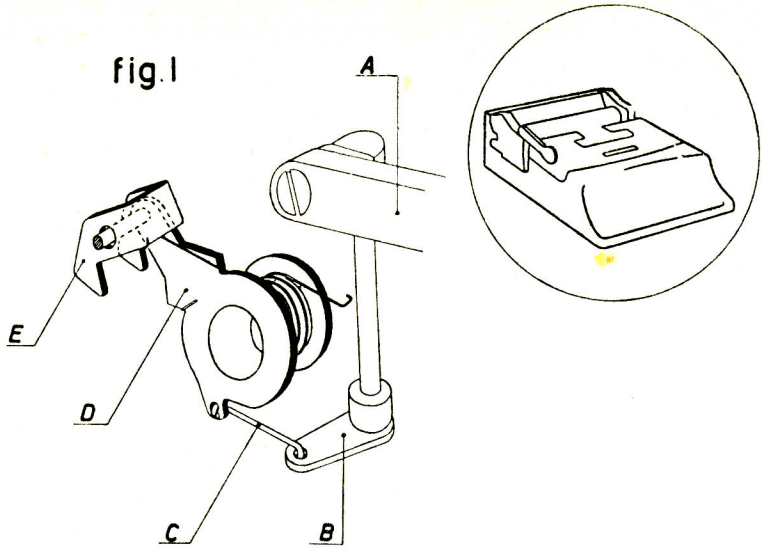
fig. II

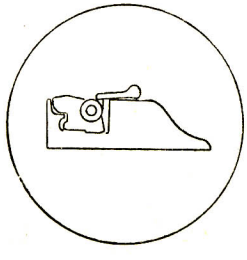
Line spacing - Position 0.

Line spacing is controlled by lever **A** (figure I) which, through crank **B**, brings pull rod **C** into action. The latter causes rotation of crank **D**. The pawl **E** of crank **D** operates directly on the line spacing wheel. The line spacing wheel **F** is held stationary, in its position of rest, by the positioner **X** (figure II). Spring **m** maintains positioner **X** pressed against wheel **F**.

When the small lever of cam **G** is placed in position **0** its shank **a** moves positioner **X** away from wheel **F** (fig. III). The platen is therefore released and can be freely rotated.

fig. I





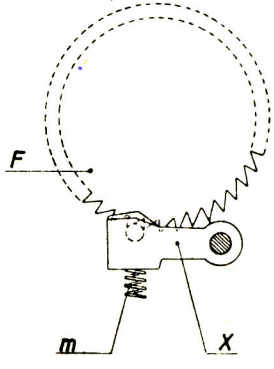


fig. II

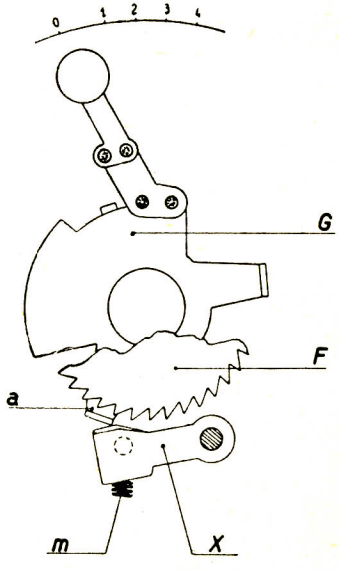
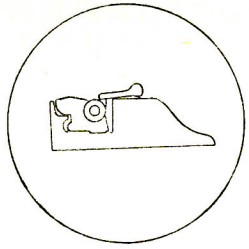


fig. III

Positions of line spacing controls.

If the line space selector is in position **1** (figure I) and the line space lever is operated, pawl **E** moves and rides on the edge of cam **G** over a certain distance. It then falls between two teeth of ratchet wheel **F** (shown shaded) and propels the latter until arrested by stop **H** (shown dotted). The line spacing wheel has moved round through two pitches.

In figure II the line space lever is in position 4. Pawl **E** is given a small idling stroke and the line spacing wheel turned through the desired five pitches.



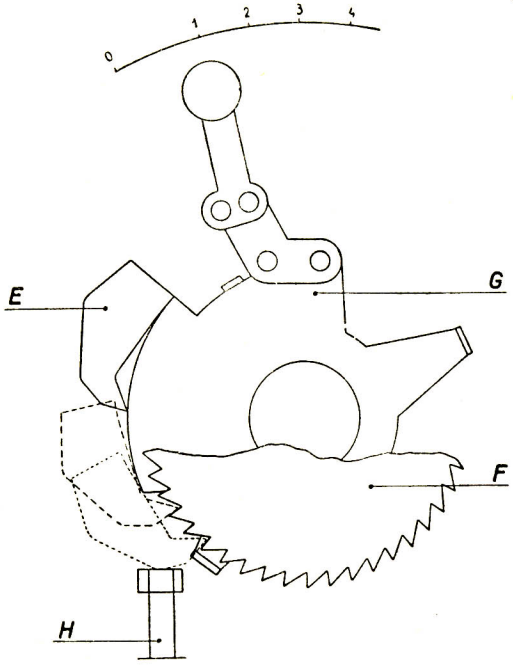


fig.I

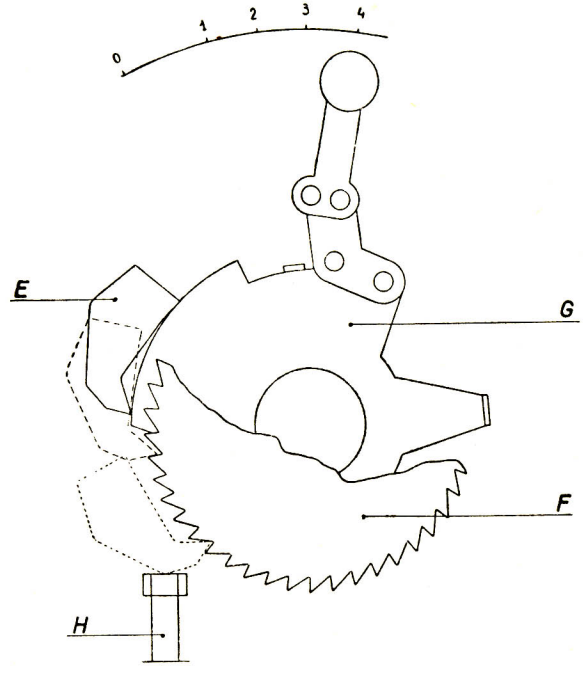
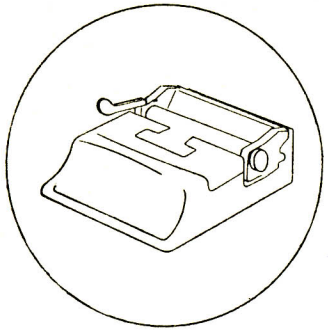


fig. II

Clutch.

When the clutch knob is pressed, the piston **A** moves from left to right. Pin **C**, which slides freely in the slot of shaft **B**, moves flange **D** (figure I) disengaging it from the line spacing ratchet wheel **F** (figure II). In this manner the platen remains independent of the line spacing ratchet wheel and can be moved freely.



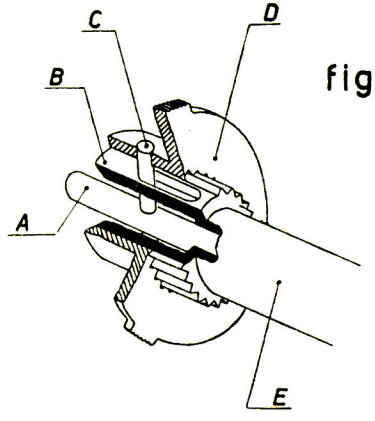


fig. I

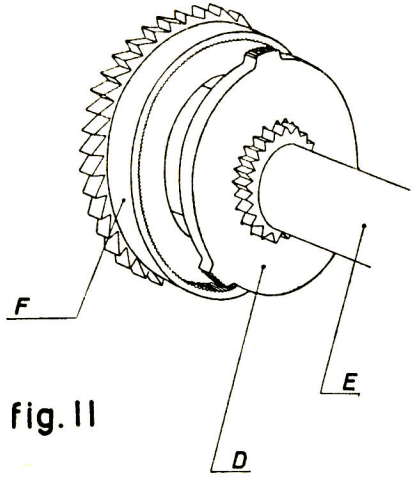


fig. II

INSTRUCTIONS FOR ASSEMBLY AND ADJUSTEMENT

In the following descriptions, **left** and **right** always mean when locking at the machine from the front, i. e. with the keyboard facing the operator. The **back** is the part where the carriage is, the **front** is where the keyboard is located.

1 - FIGURES 1 and 1 a

a) Screw a nut 138 40 5 on the two conical pivot screws 129 40 4. Place the latter on the two side of the support of the keyboard levers and first movement lever bracket P4 A 5.

b) Put the two-colour change lever P4 GL 44 on the right of the shift frame shaft P4 GG 3. The change lever should strike against the right-hand lever of the frame. ts small knob should be turned towards the front.

c) Put frame P4 GG 3 in the rear notch of bracket P4 A 5. The frame lever and that of the two-colour change lever should project through the openings for them in the front of the bracket. Secure frame P4 GG 3 with two conical pivot screws 129 40 4.

d) Adjust the position of frame P4 GG 3 axially by moving the two pivot screws 129 40 4 as required. The following two conditions should be reached.

— The left-hand lever **S** of P4 GG 3 (fig. 1a) should be a distance of 3.75 mm. (0.1476 of an inch.) from the left-hand side of the slot.

— The frame P4 GG 3 should have a minium axial play (mm. 0,03—0.0012 of an inch.) leaving it completely free to rotate.

When these two conditions are obtained, lock nuts 138 40 5 on the two conical pivot screws 129 40 4.

e) Fix the lever of the shift lock P4 G 16 on the left-hand shift frame lever P4 GG 3 with stud P4 G 17 and nut 138 30 5. Check that it rotates with perfect freedom.

Hook spring 62 30 11 between P4 G 16 and the corresponding lever of P4 GG 3.

P4 A 5	Key and first movement lever support	P4 GL 44	Two-colour shange lever
P4 G 16	Shift lock lever	129 40 4	Conical pivot screw for P4 GG 3
P4 G 17	Cheese head pivot stud screw for P4 G 16	138 30 5	Hexagonal nut for P4 G 17
		138 40 5	Hexagonal nut for 129 40 4
P4 GG 3	Shift frame shaft	62 30 11	Spring for P4 G 16

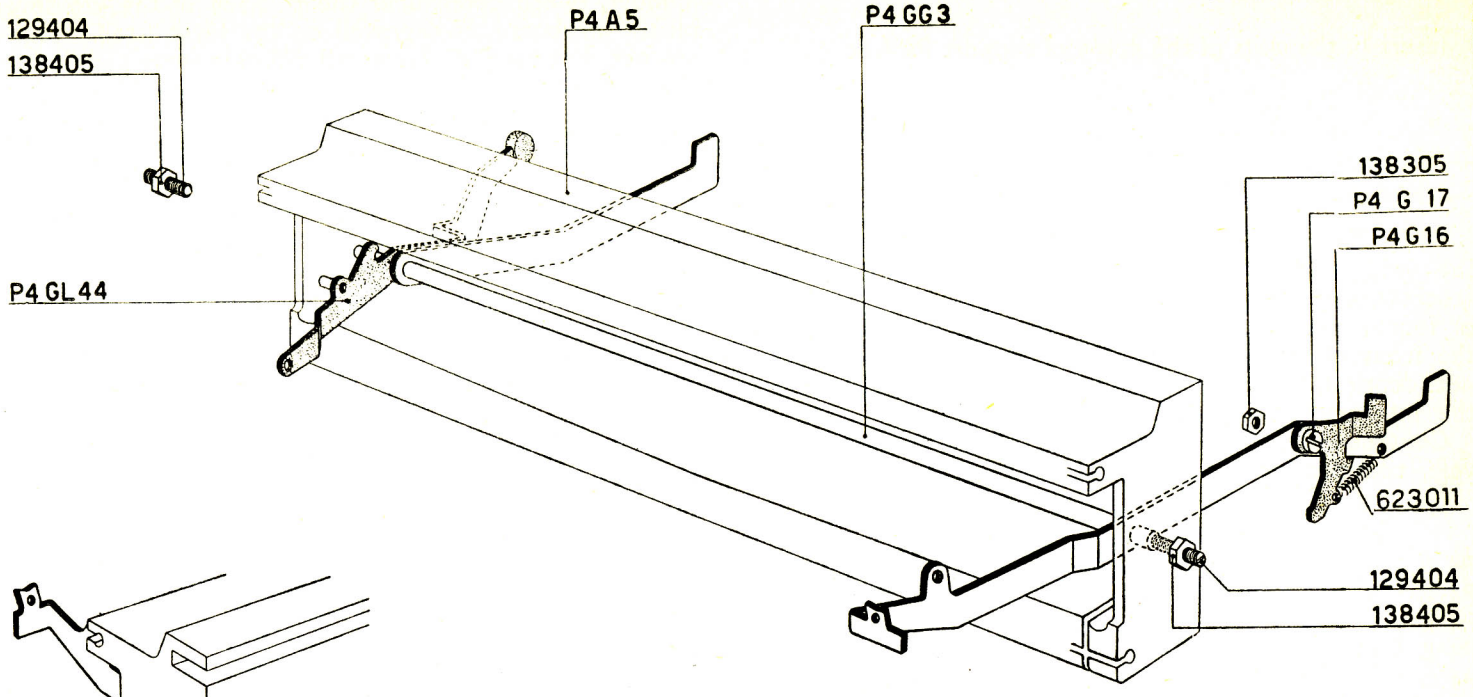

129404
138405
P4 A5
P4 GG3
138305
P4 G 17
P4 G16
P4 GL 44
623011
129404
138405

fig. 1

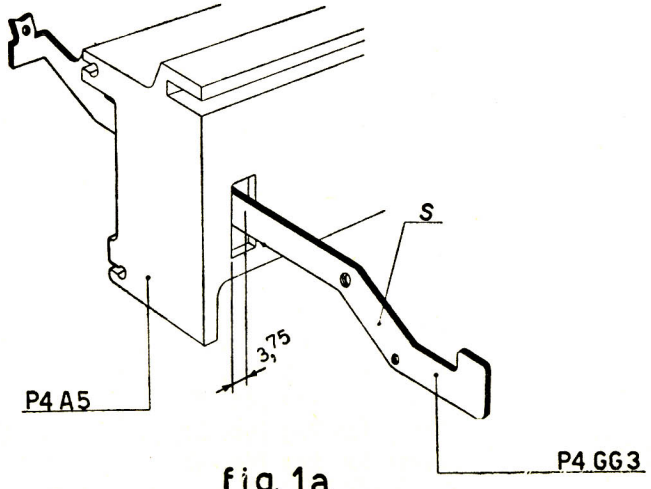

S
3,75
P4 A5
P4 GG3

fig. 1a

2 - FIGURES 2 and 2 a

Insert in the slots of the guide of support P4 A 5:

— the 43 key levers;
— the margin release lever P4 Q 4;
— the back space lever P4 N 1;
— the tabulator key lever P4 V 1.

N. B. The levers of the typing keys are coded with the symbols P4 B 1/..., P4 B 2/..., P4 B 3/..., P4 B 4/... in accordance with their position on the first, second, third or fourth row of the keyboard. The first row is nearest the front of machine. The levers in the same row are not identical, but differ in the length of the arm on which the intermediate control link is hooked.

Consequently, the key levers are numbered progressively, commencing with the first key on the left. This number, which determines the position of the key lever on the keyboard, is engraved on the lever itself. There are not, however, 43 levers all differing from each other. For example, the 24th is the same as the 20th, consequently, where the 24th lever is accommodated in the slot of the comb guide P4 A 5, lever marked No. 20 is inserted.

The plate at the side which illustrates diagramatically the composition of the 43 cinematics, is a guide to the assembly of the typing key levers in the correct order.

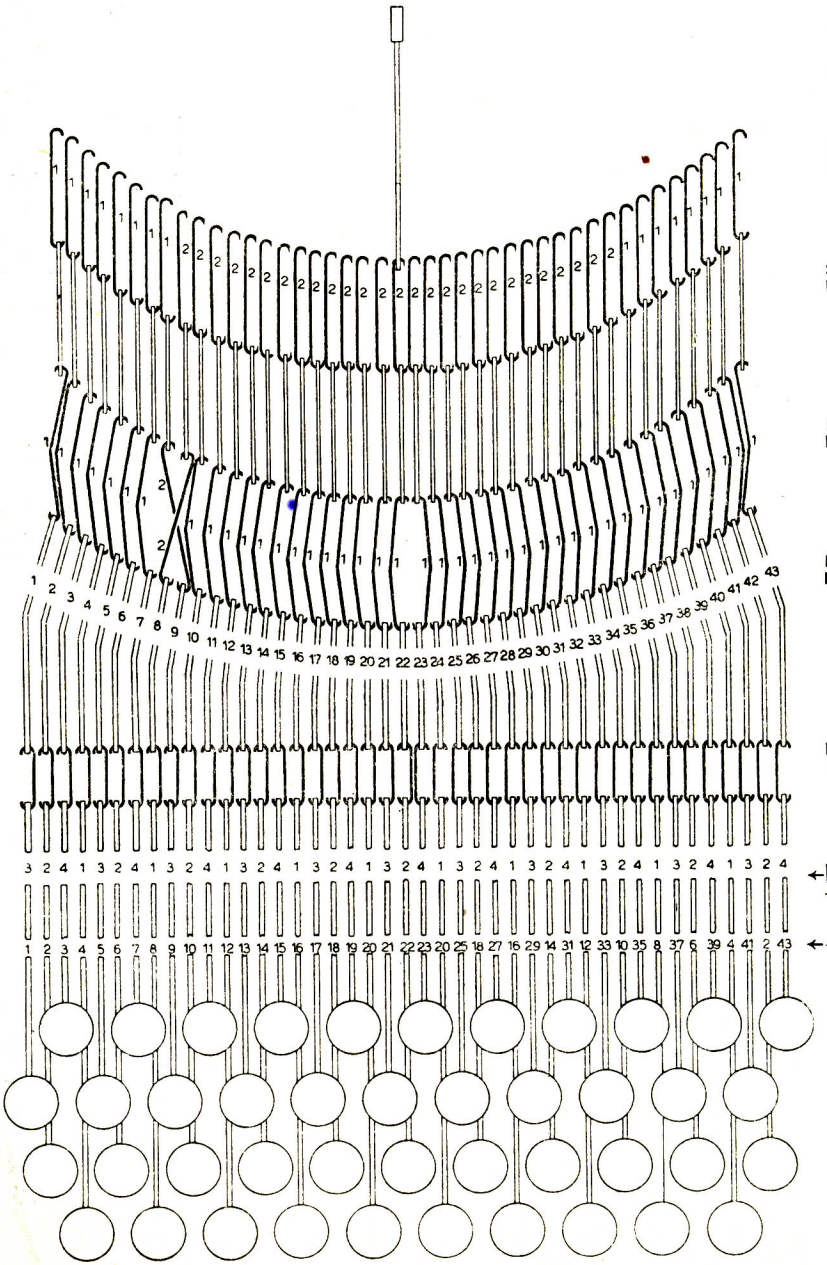
The complete code symbol for the levers of the typing keys is as follows:

— P4 B 3/5 = third row lever - fifth position from the left;

— P4 B 1/20 = first row lever - twentieth position from the left.

P4 B 1/4	Lever for key No. 4 and No. 40
P4 B 1/8	Lever for key No. 8 and No. 36
P4 B 1/12	Lever for key No. 12 and No. 32
P4 B 1/16	Lever for key No. 16 and No. 28
P4 B 1/20	Lever for key No. 20 and No. 24
P4 B 2/2	Lever for key No. 2 and No. 42
P4 B 2/6	Lever for key No. 6 and No. 38
P4 B 2/10	Lever for key No. 10 and No. 34
P4 B 2/14	Lever for key No. 14 and No. 30
P4 B 2/18	Lever for key No. 18 and No. 26
P4 B 2/22	Lever for key No. 22
P4 B 3/1	Lever for key No. 1
P4 B 3/5	Lever for key No. 5
P4 B 3/9	Lever for key No. 9
P4 B 3/13	Lever for key No. 13
P4 B 3/17	Lever for key No. 17
P4 B 3/21	Lever for key No. 21

P4 B 3/25	Lever for key No. 25
P4 B 3/29	Lever for key No. 29
P4 B 3/33	Lever for key No. 33
P4 B 3/37	Lever for key No. 37
P4 B 3/41	Lever for key No. 41
P4 B 4/3	Lever for key No. 3
P4 B 4/7	Lever for key No. 7
P4 B 4/11	Lever for key No. 11
P4 B 4/15	Lever for key No. 15
P4 B 4/19	Lever for key No. 19
P4 B 4/23	Lever for key No. 23
P4 B 4/27	Lever for key No. 27
P4 B 4/31	Lever for key No. 31
P4 B 4/35	Lever for key No. 35
P4 B 4/39	Lever for key No. 39
P4 B 4/43	Lever for key No. 43


Second movement pull rods P4 B 72/.....
Second movement levers P4 B 26
First movement links P4 B 24/....
First movement levers P4 B 23/....
Key lever links P3 B 22
Key levers P4 B...../.....

a) Place support P4 A 5 in the position shown in figure 2. Introduce on the left hand side the undersized wire pin (2,6 UA 8058/1) and advance it little by little as one by one the levers making up the keyboard are placed in their respective guide slots.

b) Assemble the levers on comb P4 A 5 in the following order:

1st slot	left free
2nd slot	margin release lever P4 Q 4
3rd-12th slot	typing key levers in the order indicated in the diagram
13th slot	left arm of the space bar frame P4 GH 4
14th-36th slot	typing key levers in the order indicated in the diagram
37th slot	right arm of the space bar frame P4 GH 4
38th-47th slot	typing key levers in the order indicated in the diagram
48th slot	left free
49th slot	back space key lever P4 N 1
50th slot	tabulator key lever P4 V 1.

N. B. Before placing levers P4 N 1 and P4 V 1 on the wire pin, hook on to it link P3 B 22 in the direction shown in figure 2 a.

c) Insert wire pin P4 B 28 at the same time removing the one with the undersize diameter.

d) Check the complete freedom of movement of each individual lever in its corresponding guide slot.

e) On the front of the arms of the space bar frame P4 GH 4, assemble the bar P4 GH 1. Secure it with two nuts 138 30 5. Check that bar P4 GH 1 is level.

P4 A 5	Key levers and first movement support
P4 B 1/...	First row key levers
P4 B 2/...	Second row key levers
P4 B 3/...	Third row key levers
P4 B 4/...	Fourth row key levers
P4 B 28	Wire pin for keys and first movement levers
P4 GH 1	Space bar
P4 GH 4	Space bar frame
P4 N 1	Back space key lever
P4 Q 4	Margin release key lever
P4 V 1	Tabulator lever
P3 B 22	Key lever links
P3 Q 11	Margin release key
P3 V 4	Column selector key
138 30 5	Nut for P4 GH 1

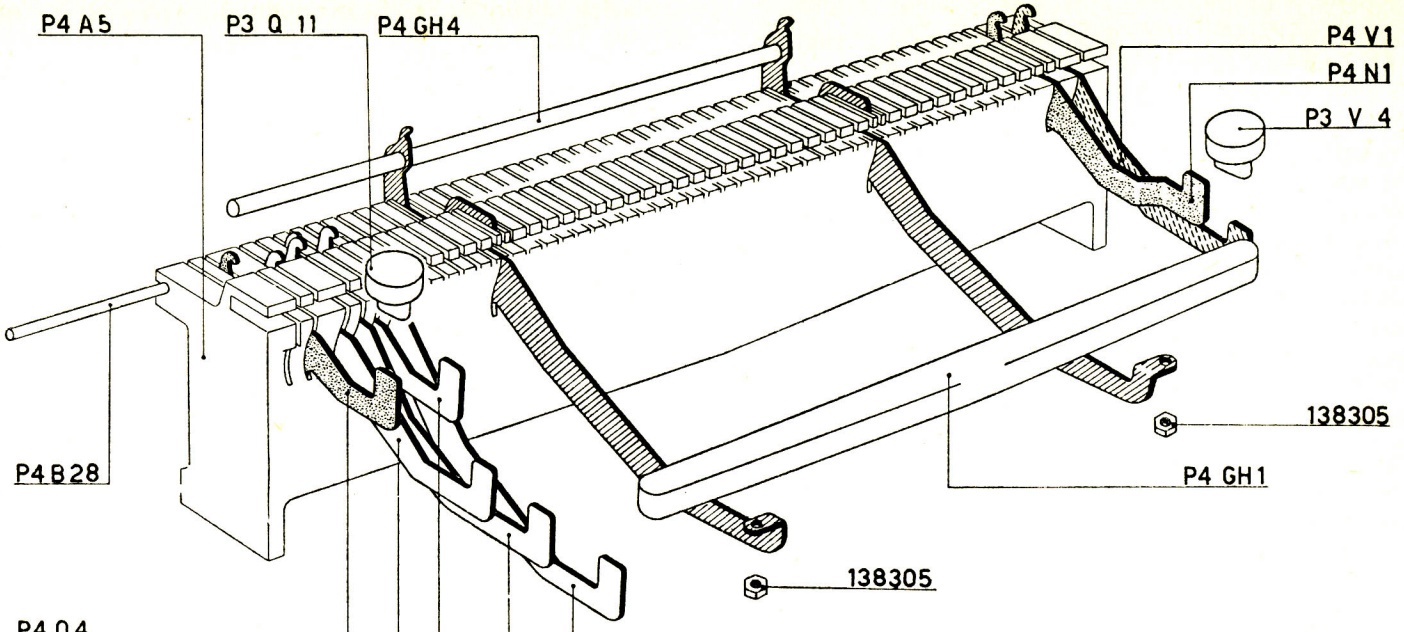

P4 A5
P3 Q 11
P4 GH4
P4 V1
P4 N1
P3 V 4
138305
P4 GH1
138305
P4 B28
P4 Q4
P4 B3/3
P4 B4/4
P4 B2/2
P4 B1/1

fig. 2

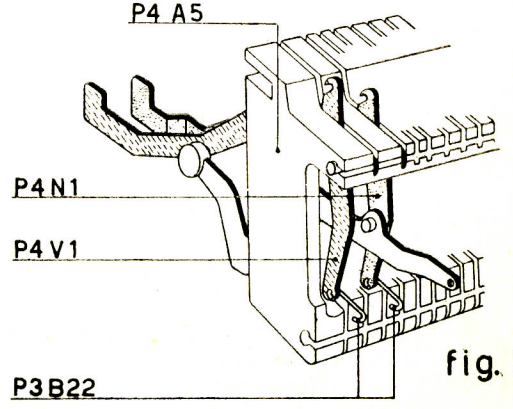

P4 A5
P4 N1
P4 V1
P3 B22

fig. 2a

3 - FIGURE 3

Mount the sector P4 GL 59 on the front part of support P4 A 5. The slot of its rear shank is placed on the shaft of the shift frame P4 GG 3 to the right of the two-colour change lever P4 GL 44. Secure the sector to the support with two screws 120 30 3 which should be partially screwed in and not locked.

Move sector P4 GL 59 in the direction of its slot so as to reduce the axial play of lever P4 GL 44 to the minimum compatible with complete freedom in rotation.

In addition, check that the sector P4 GL 59 is absolutely vertical and that the shift frame still rotates freely.

The rear shank of P4 GL 59 may, in fact, interfere with its free movement.

Having obtained the above conditions, screw in the two screws 120 30 3.

4 - FIGURE 4

Hook links P3 B 22 to the key levers. Place support P4 A 5 as shown in the figure and proceed as follows:

a) From the first lever on the left to the twenty-second (corresponding on the standard keyboard to the letter H) hook as many links P3 B 22, in the direction shown in figure 4.

b) From the twenty-third to the forty-third lever, hook on twenty-one links in the opposite direction.

P4 A 5	Key lever and first movement support	P4 GL 59	Sector for two-colour change lever
P4 GG 3	Shift frame	P3 B 22	Key lever links
P4 GL 44	Two-colour change lever	120 30 3	Cheese head screws for P4 GL 59

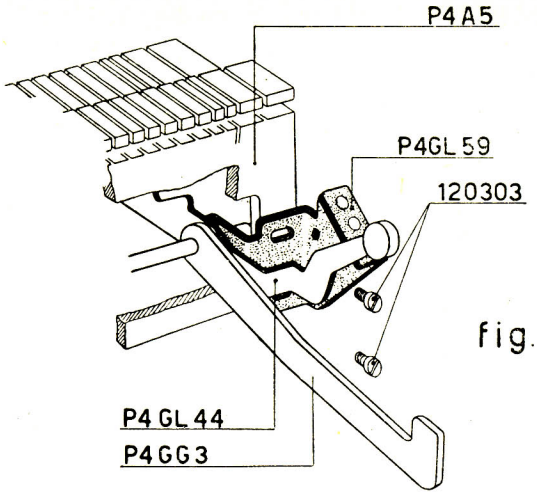


fig. 3

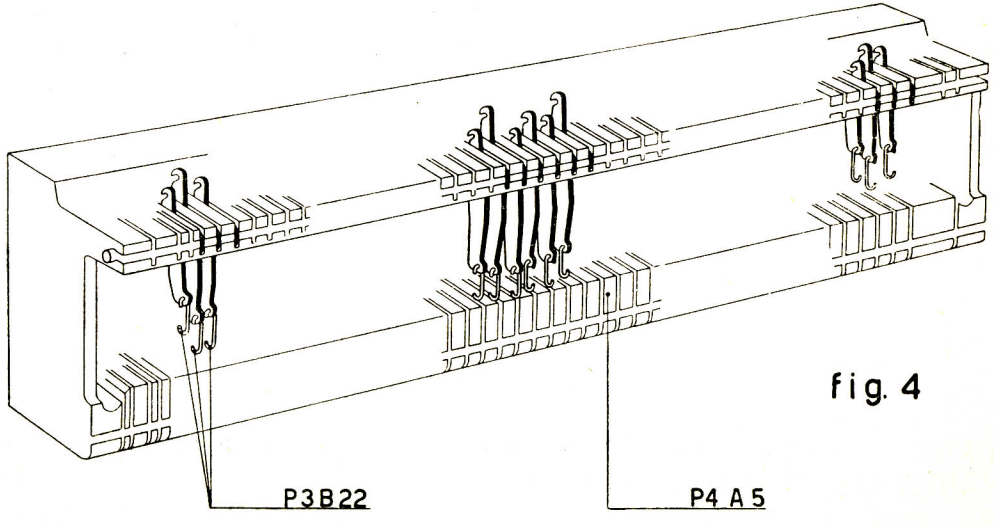


fig. 4

5 - FIGURE 5

The first movement levers P4 B 23/1 ÷ 43 are all different from each other. Some of them have the same profile, but the upper bend is set in the opposite direction.

They are numbered progressively from 1 to 43. Note that only on the central lever has the engraving of its number (22) been omitted. The numeration of key levers is always understood as being from left to right.

The code symbol of the first movement levers is indicative of the exact position which each lever must take. For example:

— the P4 B 23/1 is the first lever on the left;

— the P4 B 23/22 is the centre lever;

— the P4 B 23/43 is the lever placed at the extreme right.

In whatever case, it is very simple to recognize the position which an individual lever should take. Starting from the centre and working towards the two sides, their vertical stems become longer and the bends sharper.

a) Place the support P4 A 5 as shown in the figure 5.

b) Hook the links of the corresponding key levers to the first movement levers P4 B 23/23. This job should be carried our with the help of a spring anchoring tool. Place P4 B 23/23 in the corresponding guide slot of the support. Insert on the left of the latter, wire pin P4 B 28 which is advanced until the first movement lever, already in position, is hinged on it.

c) Continue with the assembly of the first movement levers until P4 B 23/43 is reached.

d) Slide the wire pin P4 B 28 to the right so as to free the slot where the first movement lever P4 B 23/22 must be placed.

e) Mount the first movement lever P4 B 23/22, following the instructions already given, and continue in order until P4 B 23/1 is in position.

N. B. If the assembling has been correctly done, i. e. by placing the first movement levers in their exact positions, it should be found that:

— the horizontal shanks form the arc of a circle;

— the links P3 B 22 are almost all horizontal except two which are somewhat sloped. These correspond to levers P4 B 23/11 and P4 B 23/32.

P4 A 5	Key lever and first movement support
P4 B 23/1 ÷ 43	First movement levers
P4 B 28	Wire pin for key and first movement levers

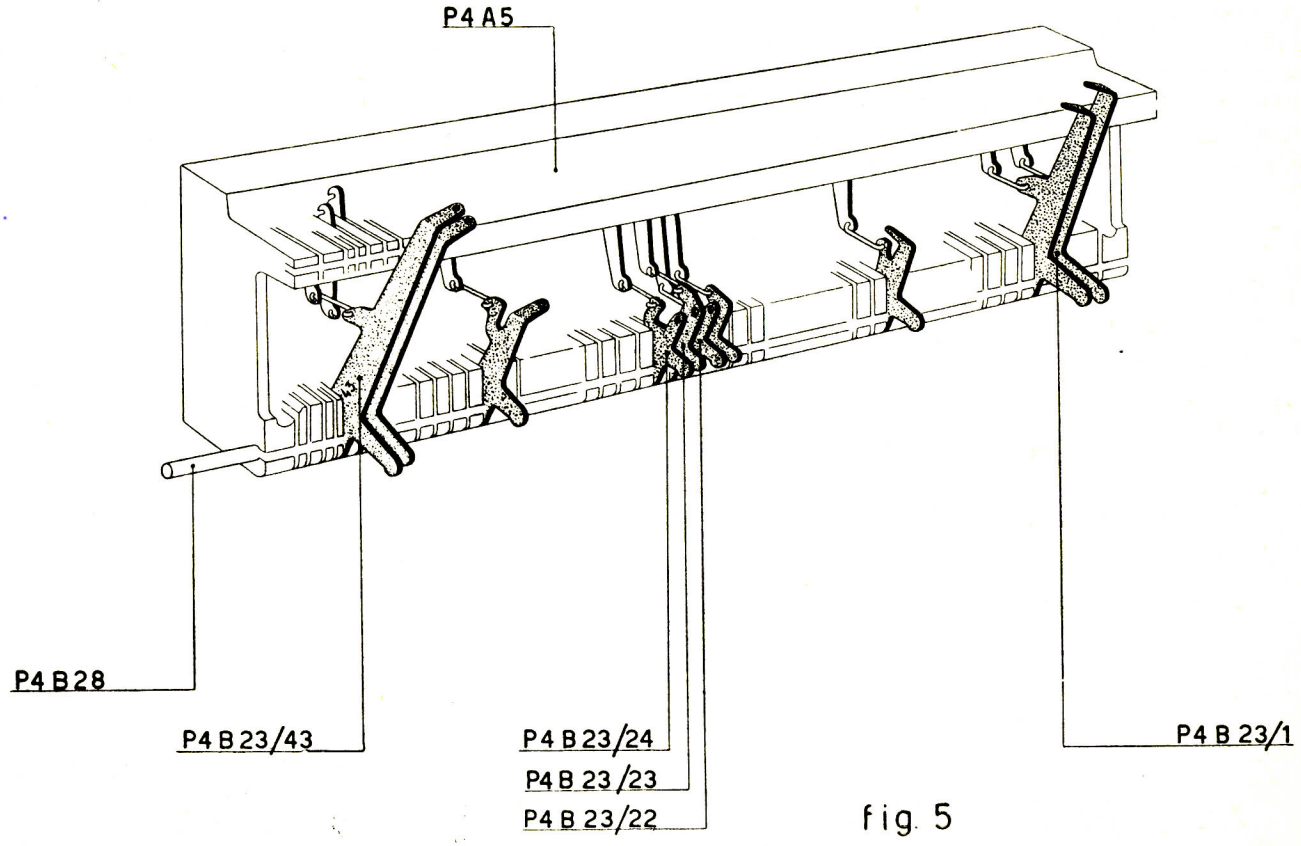


fig. 5

6 - FIGURES 6 and 7

a) Place the support P4 A 5 in the position indicated in the figure.

b) Pull the wire pin P4 B 28 towards the left so as to free the first three slots on the right of the support.

c) The first movement lever of the back spacer P4 N 7, after link P3 B 22 of lever P4 N 1 has been hooked on to it, is then placed in the third slot (figure 6).

Advance the wire pin P4 B 28 until lever P4 N 7 mentioned above is stopped.

d) The two-colour trip crank P4 L 45 is placed in the second slot. Push the wire pin until the former is hinged on it.

Between P4 L 45 and the two-colour change lever P4 GL 44, hook spring 61 40 1/P (figure 7).

e) In the last slot, place the second lever P4 N 7 after having hooked on to it link P3 B 22 of lever P4 V 1.

Advance the wire pin P4 B 28 until P4 N 7 is hinged on it.

P4 A 5	Key lever and first movement support
P4 B 28	Wire pin for key levers and first movement
P4 L 45	Two-colour trip crank
P4 GL 44	Two-colour change lever
P4 N 1	Back space key lever
P4 N 7	First movement back space and tabulator lever
P4 V 1	Tabulator key
P3 B 22	Key lever links
61 40 1/P	Spring for P4 L 45

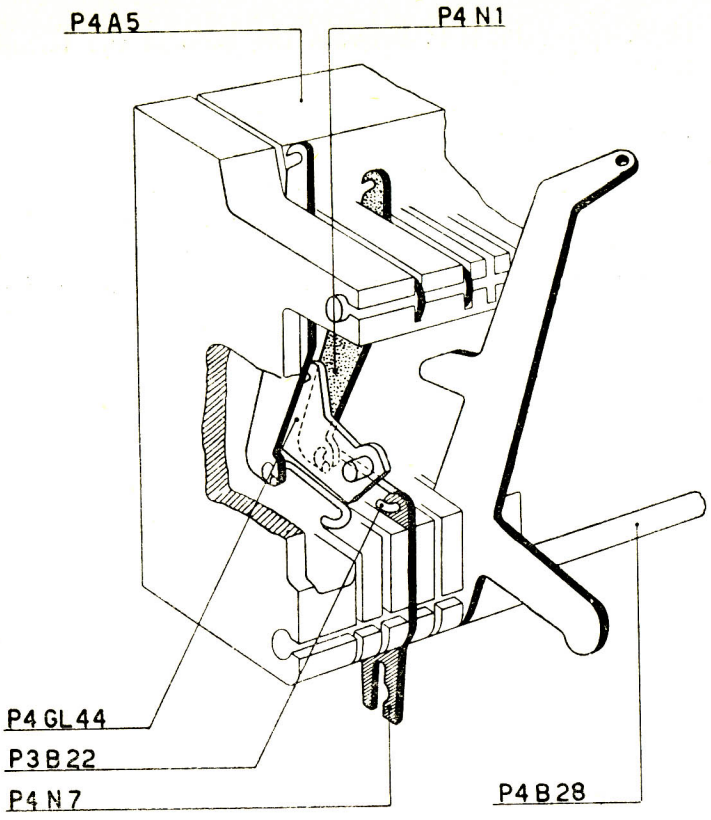
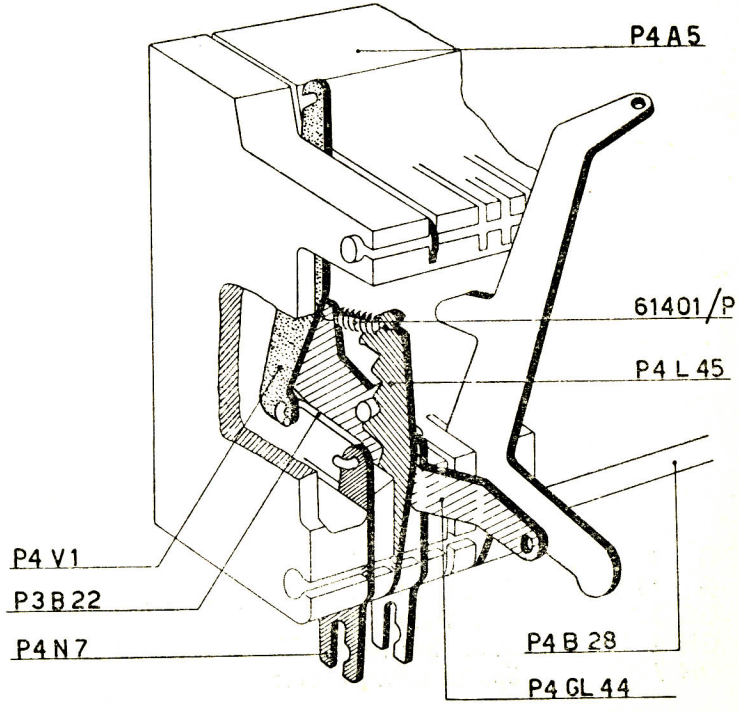

P4 A5
P4 N1
P4 GL 44
P3 B 22
P4 N7
P4 B 28

fig. 6

fig. 7


P4 A5
61401/P
P4 L 45
P4 V1
P3 B 22
P4 N7
P4 B 28
P4 GL 44

7 - FIGURE 8

The two-colour change lever P4 GL 44 should be in contact whith its sector P4 GL 59. If necessary, adjust the lower bend of P4 GL 44 with a setting tool **G**.

Check again that the shift frame rotates freely.

8 - FIGURE 9

Mount the shift pull rod P4 G 4 on the left lever of the shift frame P4 GG 3 using a spring holding stud P4 G 10.

Hook spring M2 H 14 between the bend of the former and stud P4 G 10.

9 - FIGURE 9

Secure the control lever P4 GH 7 at the left end of the space bar frame shaft with its screw 125 30 26.

Temporarily set the lever so that it does not interfere with other pieces. Do not tighten screws right home.

P4 G 4	Shift pull rod
P4 G 10	Special stud for shift pull rod
P4 GG 3	Shift frame
P4 GH 4	Space bar frame
P4 GH 7	Spacer control lever

P4 GL 44	Two-colour change lever
P4 GL 59	Sector for two-colour change lever
M2 H 14	Spring for shift flexible joint
125 30 26	Special clamp screw for P4 GH 7

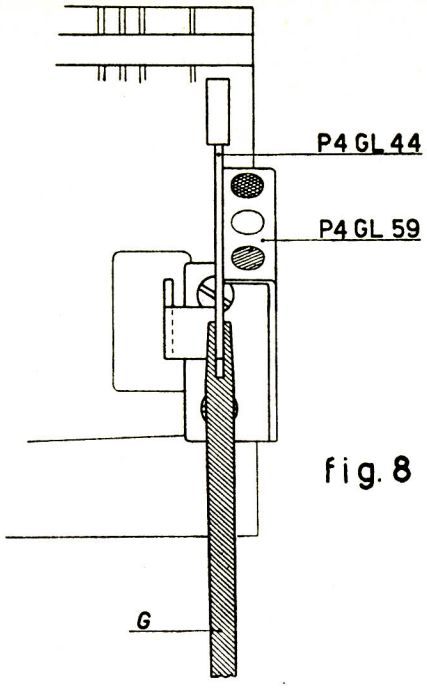


fig. 8

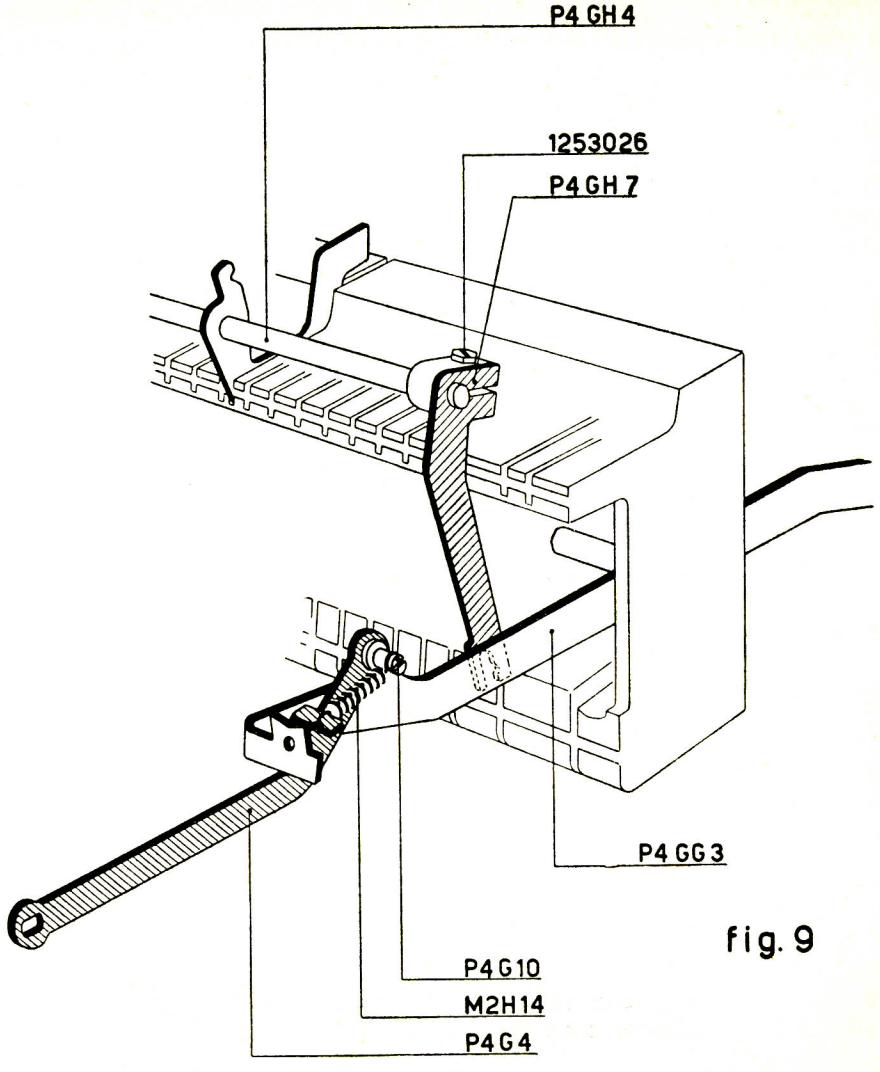


fig. 9

10 - FIGURE 10

a) Place the support P4 A 5 as shown in the figure.

b) Insert two short wire pins from the right of the support, so as to partially expel the proper wire pins **A** and. **B**. The third slot, upper right, and the fourth slot, lower right, must be cleared. In them is placed arm **D** of key locking frame P4 Q 10.

Advance wire pins **A** and **B** so that the frame arm is hinged on them and at the same time push out the short pins.

c) Move wire pins **A** and **B** to the right so as to free the first slots on the left (lower and upper) of the support P4 A 5. In them place left arm **S** of frame P4 Q 10.

d) Replace the wire pins in their normal position.

N. B. The wire pin **A** is the fulcrum of frame P4 Q 10. Wire pin **B** determines the limit of its travel.

e) Check the complete freedom of rotation of frame P4 Q 10. Make sure that its arms **S** and **D** are level.

11 - FIGURE 10

Arrange the stop lever leather strip in its seat on the front of bracket P4 A 5. The rough surface should be face up and a thin layer of adhesive should be placed on it.

The leather strip should be centred in respect of support P4 A 5 and pressed down to the bottom of its seat.

P4 A 5 Key lever and firt movement support
P4 A 10 Leather strip for stop lever
P4 Q 10 Key lever locking frame

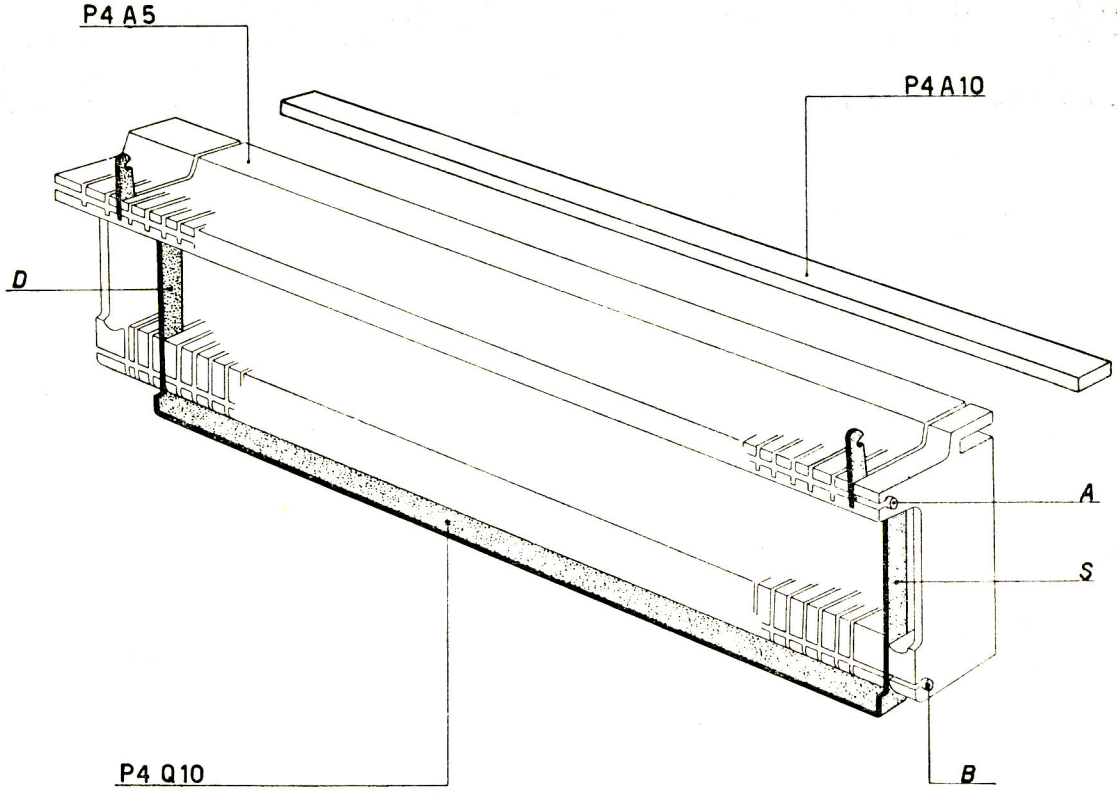


fig. 10

12 - FIGURES 11 - 12

a) Fix the rubber caps P4 G 12 on the four regulators of shift P4 G 11 (figure 11). The head of the regulator should be inserted into the special cavity made in the cap itself.

b) On left hand side member P4 A 1, mount:

— on nipples **A** and **B**, two of the four regulators now prepared, securing them with nuts 138 40 5;

— on nipples **C** and **D**, the regulators P3 I 12 with corresponding nuts 138 40 5. As a preliminary adjustment, see that only a single thread of the regulator P3 I 12 projects from the upper surface of the nipples.

P4 A 1	Side member - left hand	P3 I 12	Trip regulator V. T.
P4 G 11	Shift regulator	138 30 5	Hexagonal nut for P3 I 12
P4 G 12	Rubber cap for shift regulator	138 40 5	Hexagonal nut for P4 G 11

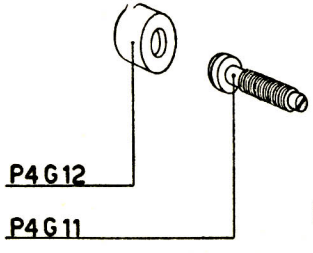

P4G12
P4G11

fig. 11

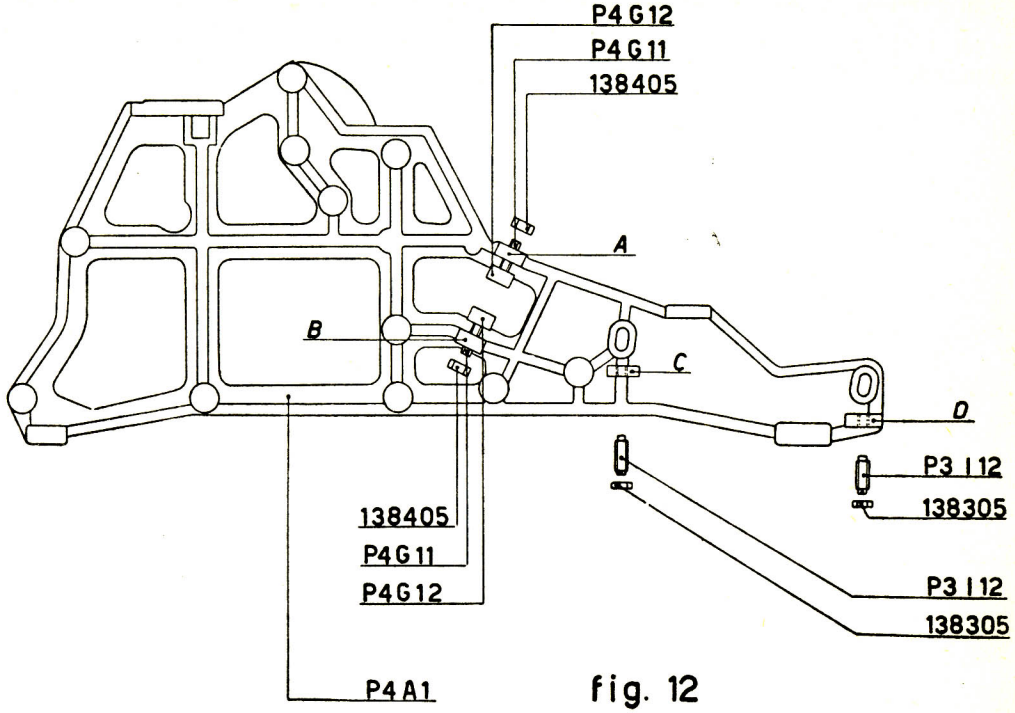

P4G12
P4G11
138405
A
B
C
D
P3I12
138305
138405
P4G11
P4G12
P3I12
138305
P4A1

fig. 12

12 - FIGURES 13 and 13a

On the right hand side member P4 A 2 assemble:

— on nipples **A** and **B** the two regulators previously prepared, securing them with nuts 138 40 5;

— on nipples **C** and **D**, the regulators P3 I 12 with 138 30 5. As a preliminary adjustment, see that only a single thread of the regulator P3 I 12 projects from the upper surface of the nipple.

The ribbon carrier stop eccentrics P4 L 43 in holes **E** and **F**, securing them with nuts 138 35 1.

P4 A 2	Side member - right hand	P3 I 12	Trip regulator N. T.
P4 G 11	Shift regulator	138 30 5	Hexagonal nut for P3 I 12
P4 G 12	Rubber cap for shift regulator	138 35 1	Hexagonal nut for P4 L 43
P4 L 43	Eccentric for ribbon carrier stop	138 40 5	Hexagonal nut for P4 G 11

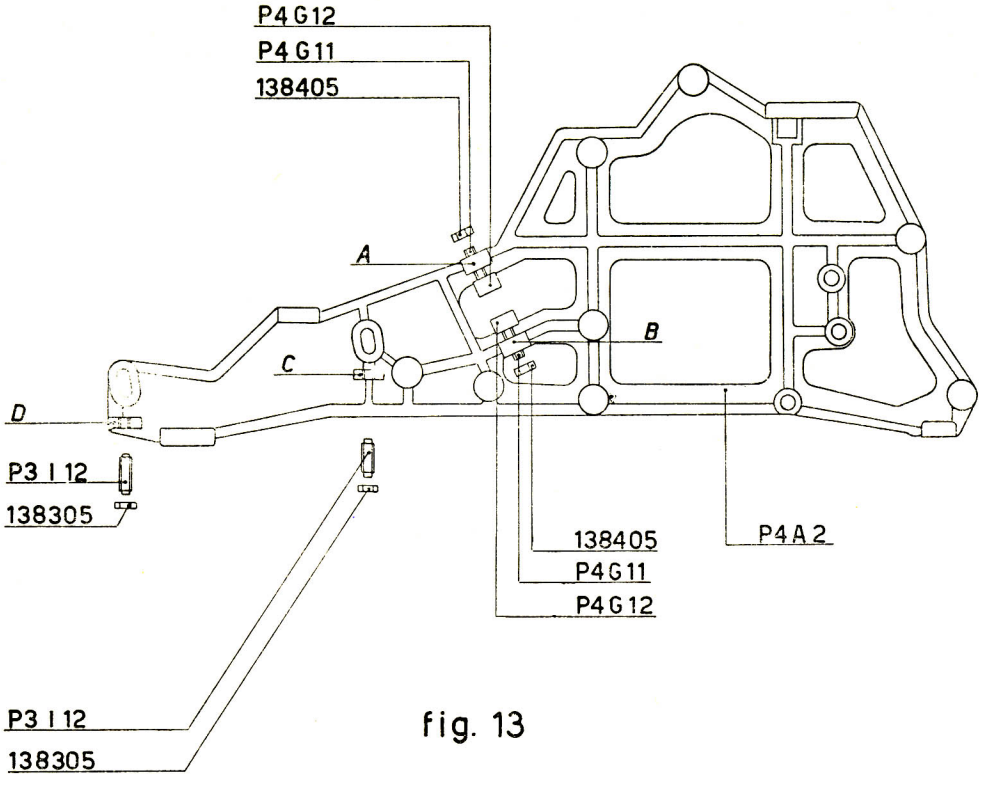


fig. 13

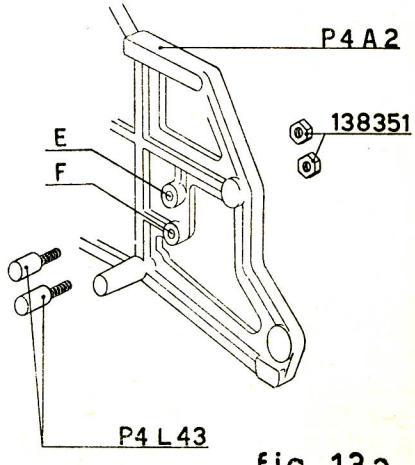


fig. 13a

13 - FIGURE 14

a) Assemble the two side members of the machine P4 A 1 and P4 A 2 on the key lever and first movement support P4 A 5, positioning them as high as possible in relation to it. Secure them with four screws 120 35 5.

b) Connect the rear part of the two side members P4 A 1 and P4 A 2 by means of the small bar UA 8178/1. Secure the latter with two screws 120 35 5.

c) Place under the side members of the machine:

— iron feet UA 8172/1 at the front;

— the temporary brackets UA 8173/5 and UA 8173/6 with the iron feet UA 8172/2 at the back.

d) Place the outer frame of the machine level on an iron plate. Screw in tightly the side member and small rear bar screws.

14 - FIGURE 14

Assemble the touch control trigger P4 B 30 and the crank for touch control spring P4 GB 31 on the left hand side member P4 A 1 with two studs 126 30 33.

15 - FIGURE 14

a) Hook four springs 61 40 1/P in the rear openings on the spring carrying cross piece P4 B 21.

b) Place the spring carrying cross piece P4 B 21 on the two side members and secure it with two screws 120 30 3 (in holes **A** and **B**).

c) Hook spring 61 40 1/P to the upper hooks of the key lever locking frame P4 Q 10 and the space bar frame P4 GH 4.

d) Hook spring No. M2 B 25 between the 46 bent extensions of the spring carrying cross piece P4 B 21 and the hooks of the:

— margin release lever;

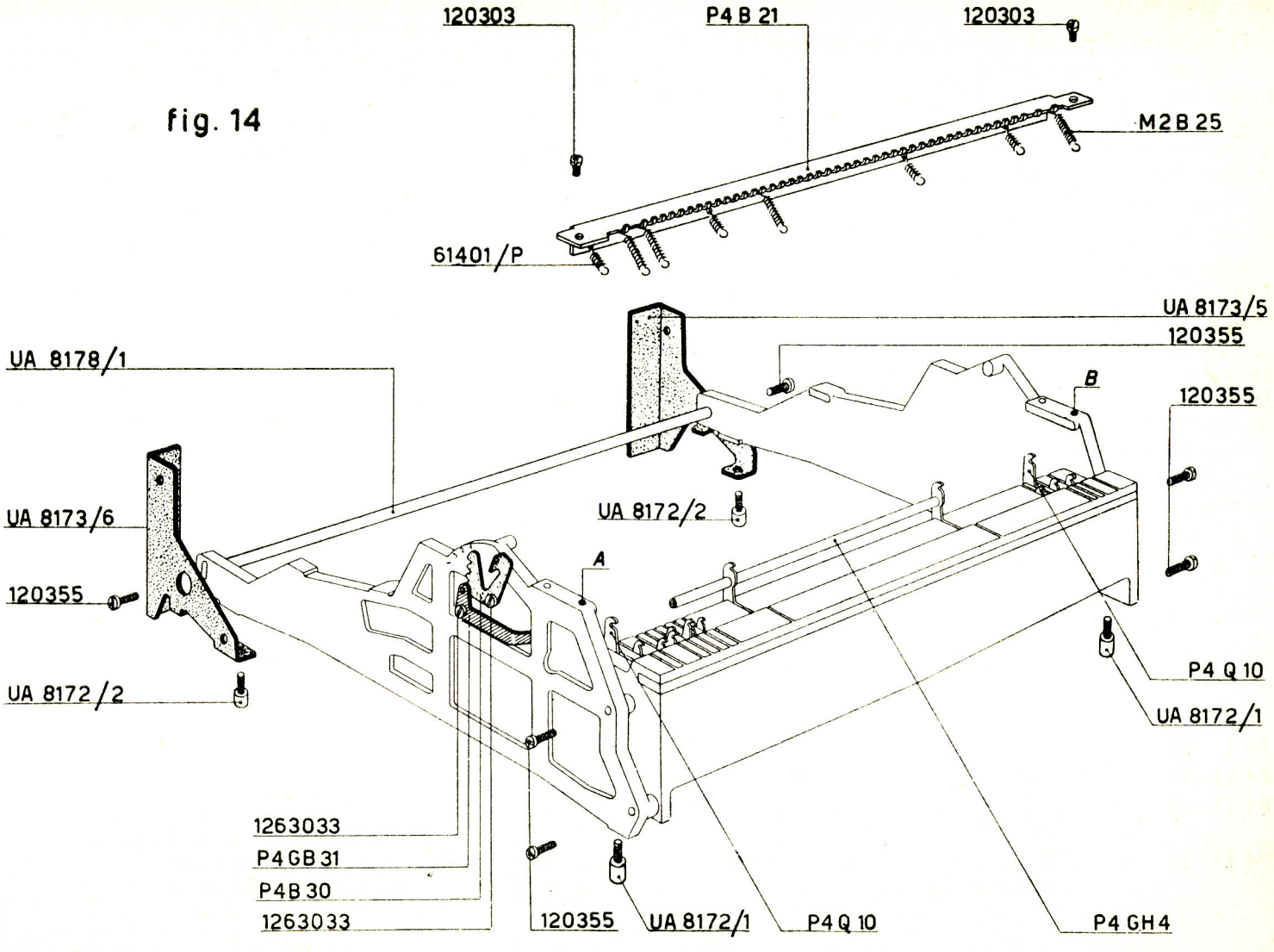
— 43 printing key levers;

— back space control lever;

— tabulator control lever.

P4 B 21	Spring carrying cross piece
P4 B 30	Touch control trigger
P4 GB 31	Crank for touch control spring
P4 GH 4	Space bar frame
P4 Q 10	Key lever locking frame
M2 B 25	Key lever return spring
UA 8172/1	Front foot
UA 8172/2	Back foot
UA 8173/5	Right hand machine support bracket
UA 8173/6	Left hand machine support bracket
UA 8178/1	Re-inforcement bar for side members
120 30 3	Cheese head screw for P4 B 21
120 35 5	Cheese head screw for P4 A 5 - UA 8178/1
126 30 33	Cheese head pivot stud screw for P4 B 30 - P4 GB 31
61 40 1/P	Spring for P4 Q 10 - P4 GH 4

fig. 14


120303
P4 B 21
120303
M2 B 25
61401/P
UA 8173/5
120355
UA 8178/1
B
120355
UA 8173/6
UA 8172/2
A
120355
UA 8172/2
P4 Q 10
UA 8172/1
1263033
P4 GB 31
P4B 30
1263033
120355
UA 8172/1
P4 Q 10
P4 GH4

16 - FIGURE 15

Preparation of the left hand ribbon holder unit P4 BL 15.

a) Place washer 40 42 1 on the spool shaft P4 EL 12. Insert the shaft in the upper opening of the left hand bracket P4 EL 15. The washer seats on the bracket itself.

On the shaft P4 EL 12, assemble in succession:

— the hole of the upper bend of the left hand lug P4 L 25;

— washer 40 31 2;

— the small spring for braking the spool P3 L 63.

Place the shaft in position in the lower opening of bracket P4 EL 15. Fix the ribbon feed crown wheel P3 GL 11 with its screw 124 30 7.

b) The shank **A** of lug P4 L 25 should lodge in the special guide slot made in the upper surface of the bracket P4 EL 15. Bending lug P4 L 25 gently, lodge the hole of its lower bend on the extremity of shaft P4 EL 12.

c) Move the crown wheel P3 GL 11 axially so as to give shaft P4 EL 12 an anxial play of 0,6 mm. (0.023 of an inch.). Check that the shaft itself rotates with perfect freedom; remember that its movement is slightly checked by the effect of the small spring P3 L 63.

d) Lug P4 L 25 should have the minimum axial play. At the full extent of its downward play (without forcing it, to avoid bending its two arms) the lug should not slip off the lower end of shaft P4 EL 12. If this happens, however, bend the lower arm of the lug upwards. Check that it rotates freely.

17 - FIGURE 16

Preparation of the right hand ribbon holder unit P4 BL 16.

The assembly order is the same as for the left ribbon holder unit described in the preceding paragraphs.

The only difference is that washer 40 31 2 and the small spring P3 L 63 are not fitted and in consequence the position of the crown wheel P3 GL 11 must be adjusted axially so as to leave shaft P4 EL 12 the minimum of axial play (0,05 mm.—0.002 of an inch.). Without the small spring, the play cannot be taken up and consequently reaches the value now given.

P4 L 25	Left hand reverse control lug
P4 EL 12	Spool shaft with plate
P4 EL 15	Left hand spool shaft bracket with roller
P4 EL 16	Right hand spool shaft bracket with roller and pallet
P4 EL 26	Right hand reverse control lug with trip pawl
P3 L 63	Spool braking spring
P3 GL 11	Ribbon feed crown wheel
124 30 7	Grub screw for P3 GL 11
40 31 2	Washer for P3 L 63
40 42 1	Washer for P4 EL 12

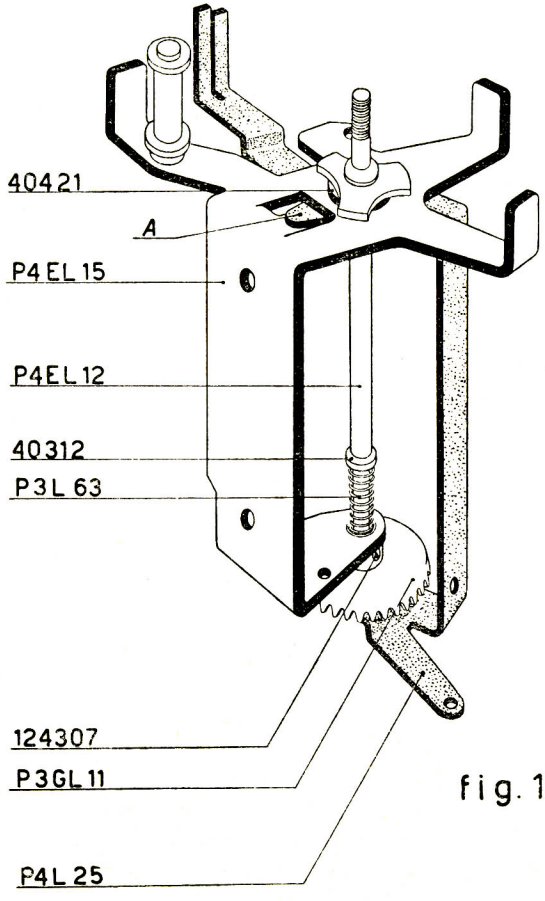

40421
A
P4 EL 15
P4EL 12
40312
P3L 63
124307
P3GL 11
P4L 25

fig. 15

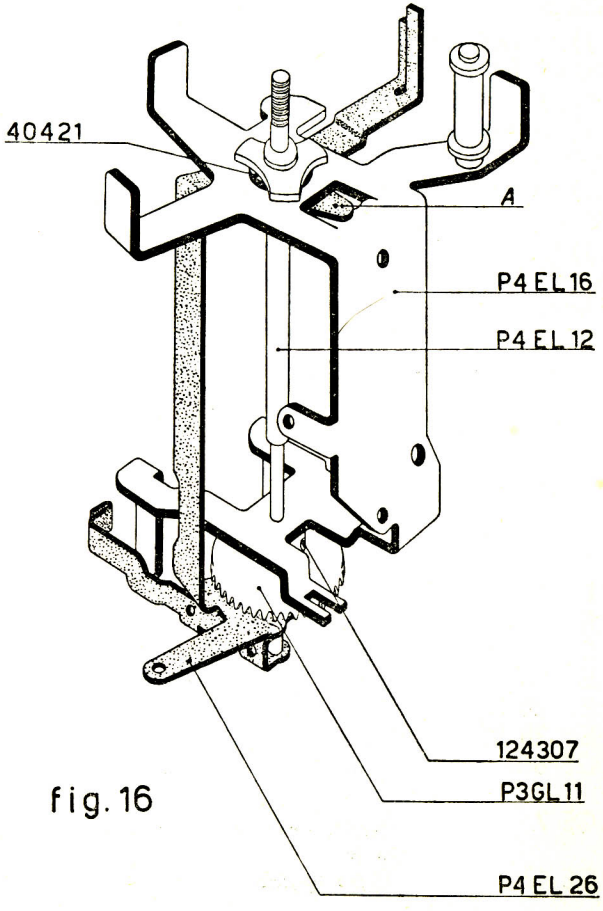

40421
A
P4 EL 16
P4 EL 12
124307
P3GL 11
P4 EL 26

fig. 16

18 - FIGURE 17

a) Hook two springs M2 E 28 on the universal frame guide bracket P4 E 26.

b) On the rear part of the type bar segment P4 E 1, assemble bracket P4 E 26 with two screws 120 30 2 which should be partially screwed in and not locked.

c) Arrange the rubber stop bush P4 E 25 on the universal frame guide pin P4 E 24. The bush must be placed so that its larger internal diameter faces the back.

d) Screw in and lock securely the pin P4 E 24, already prepared, on the back of the type bar segment.

e) Assemble universal frame P4 GE 20 on pin P4 E 24. Make sure it slides freely.

f) Moving the bracket P4 E 26 as required, place the universal frame level with respect to the milling on the segment. The two extensions of the bracket should not foul the universal frame but should have a minimum clearance. The movement of the frame is thus unimpeded.

When these conditions have been reached, screw in screws 120 30 2.

g) Hook springs M2 E 28 to frame P4 GE 20 (hole **F**).

N. B. The function of stop bush P4 E 25 is to ensure the silencing of the universal frame against the segment; when at rest, there should be a clearance of 0,1 mm. (0.004 of an inch.) between frame and segment. This conditions is reached if the bush is carefully chosen or a washer 40 75 2 (of 0,1 or 0,2 mm. thickness—0.004 ÷ 0.008 of an inch.) placed under it.

19 - FIGURE 17

The wire pin of the second movement levers should be placed corresponding to the holes and the small wire pin anchoring plate P4 E 28/D and P4 E 28/S put in position. Secure them with screws 126 30 42 and leave them in the temporary position indicated in the figure.

P4 E 1	Type bar segment
P4 E 24	Universal frame - guide pin
P4 E 25	Universal frame - stop bush
P4 E 26	Frame guide bracket
P4 E 28 D	Wire pin anchoring plate - right hand
P4 E 28 S	Wire pin anchoring plate - left hand
P4 GE 6	Left hand type bar segment support arm
P4 GE 7	Right hand type bar segment support arm
P4 GE 12	Type guide
P4 GE 20	Universal frame complete
P4 G 9	Shift shaft with arms
M2 E 28	Spring for universal frame and carriage release
120 30 2	Cheese head screw for P4 E 26
120 35 4	Cheese head screw for P4 GE 6 - P4 GE 7
126 30 42	Shouldered screw securing P4 E 28 D-S
129 40 4	Conical pivot screw for P4 G 9
32 26 1	Dowel pin for P4 GE 6 - P4 GE 7
138 40 5	Hexagonal nut for 129 40 4

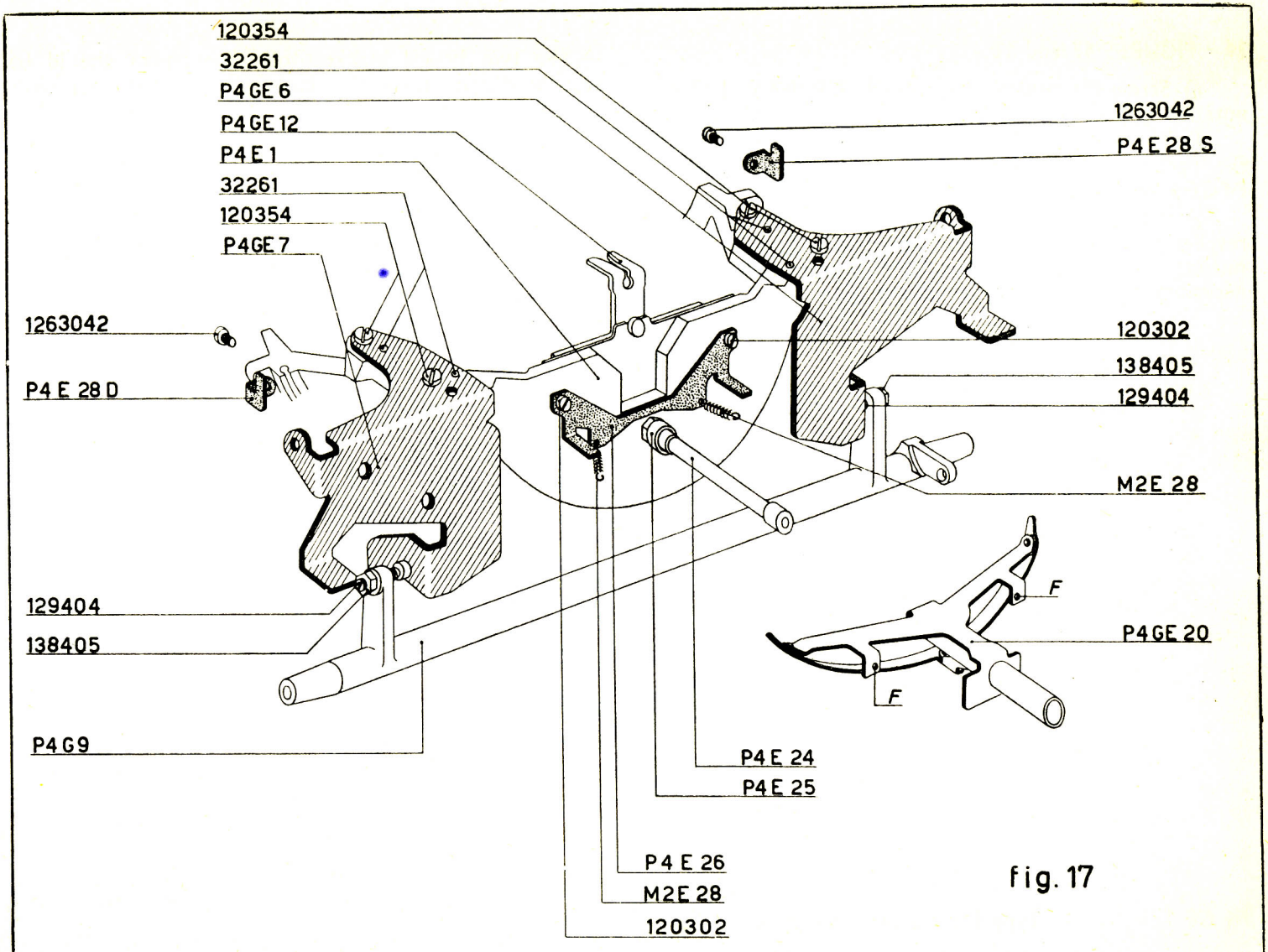

120354
32261
P4 GE 6
P4 GE 12
P4 E 1
32261
120354
P4 GE 7
1263042
P4 E 28 D
129404
138405
P4 G 9
1263042
P4 E 28 S
120302
138405
129404
M2 E 28
F
P4 GE 20
F
P4 E 24
P4 E 25
P4 E 26
M2 E 28
120302

fig. 17

20 - FIGURES 17 and 18

a) Screw the conical pivot screws 129 40 4 with their nuts 138 40 5 on the two long arms of the shift shaft P4 G 9.

b) These pivot screws should be lodged in the seats of the bushes fixed to the two lateral arms of segments P4 GE 6 and P4 GE 7.

c) Adjust the position of the type bar segment with respect to shaft P4 G 9. The adjustment is effected by moving the two pivot screws 129 40 4 as required. The necessary conditions are as follows (figure 18):

— the two lateral brackets of the segment should be equally distant from the corresponding arms of shaft P4 G 9;

— the segment should have no axial play whatever with respect to shaft P4 G 9;

having reached these conditions, lock the nuts 138 40 5.

d) Lubricate the seats of the bushes where the conical pivot screws 129 40 4 are fitted.

P4 CE 1 Type bar segment complete

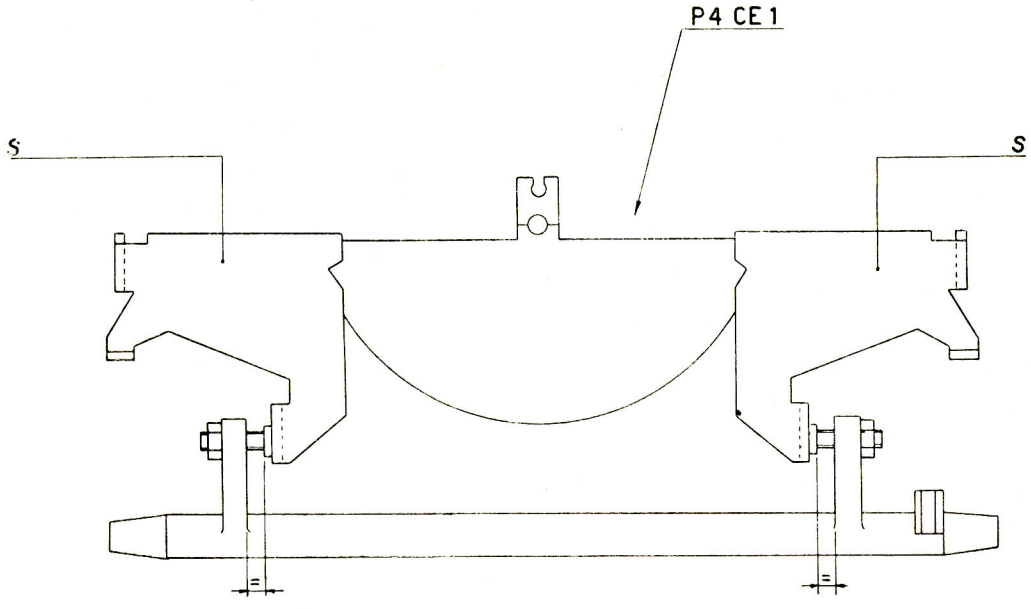


fig. 18

21 - FIGURE 19

a) Assemble the ribbon carrier unit on the left hand side member of the machine, securing it with two screws 120 30 1.

b) Fit the type bar segment, with its shaft P4 G 9, between the two side members of the machine. The shanks **A** of the two lateral brackets of the segment should be positioned between the regulators **H** which have been previously mounted on the side members.

Secure the shaft with arm P4 G 9 by means of two conical pivot screws 129 40 4 and nuts 138 40 5.

c) Assemble the left segment suspension rod P4 E 15 on the left hand side member of the machine with a stud P4 E 18. Secure the rear end of the rod to the left bracket of the segment with another stud P4 E 18 and nut 138 35 1.

d) On the right hand side of the machine place the corresponding ribbon carrier unit in position securing it with two screws 120 30 1.

e) Assemble the right hand segment suspension rod P4 E 16 on the right hand side member of the machine with a stud P4 E 18. Secure the rear end of the rod to the right hand bracket of the segment with another stud P4 E 18 and nut 138 35 1.

f) Adjust the axial position of shaft P4 G 9. Since the type bar segment is already positioned by the two suspension rods P4 E 15 and P4 E 16, P4 G 9 should be secured in the position it reaches naturally. Adjust the conical pivot screws 129 40 4 as required so as to leave P4 G 9 with a slight axial play. This play has to be checked again when the carriage has been placed into position.

Having adjusted to the desired condition, tighten nuts 138 40 5 on pivot screws 129 40 4.

Check that the type bar segment moves freely.

g) Hook spring 62 60 12/P between the bracket of the right hand ribbon carrier unit and the right hand bracket of the segment.

h) Hook spring P3 G 20 between the bracket of the left hand ribbon carrier unit and the left hand bracket of the segment. This spring is not quite as strong as 62 60 12/P.

P4 E 15	Type bar segment suspension rod - left hand
P4 E 16	Type bar segment suspension rod - right hand
P4 E 18	Special stud for segment suspension rod
P4 G 9	Shift shaft with arms
P3 G 20	Suspension spring - left hand
120 30 1	Cheese head screws for P4 EL 15 - P4 EL 16
129 40 4	Conical pivot screw for P4 G 9
138 35 1	Hexagonal nut for P4 E 18
138 40 5	Hexagonal nut for 129 40 4
62 60 12/P	Segment suspension spring - right hand

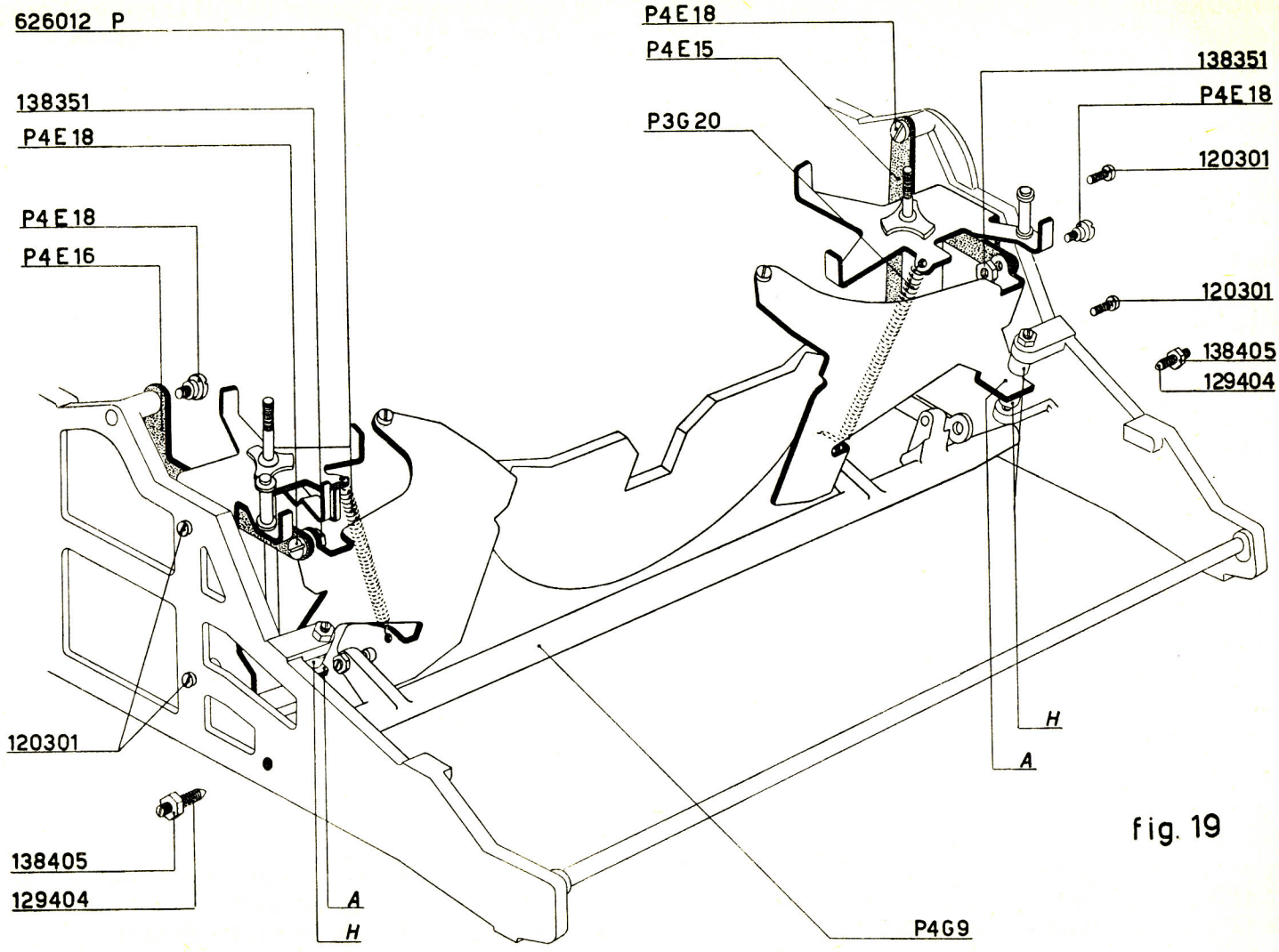

626012 P
138351
P4E18
P4E18
P4E16
120301
138405
129404
A
H
P4E18
P4E15
P3G20
138351
P4E18
120301
120301
138405
129404
H
A
P4G9

fig. 19

22 - FIGURE 20

a) Place jig UG 805 in position on the left hand side member of machine so that:

— the head of the lower screw holding the side member to the key lever support is inserted in the hole **F**;

— the pin **P1** is lodged in the hole where the shaft for ribbon feed and reverse will be placed later;

— pin **P** is inserted in the hole in arm **B** of shaft P4 G 9.

b) This operation determines the position of the type bar segment for the " small letters ".

By manipulating the regulator P4 G 11 as required, bring the rubber cap P4 G 12 into contact with shank **A** of the left hand bracket of the type segment.

The same operation must be carried out on the right hand regulator P4 G 11.

c) Remove jig UG 805.

d) Check that the two rubber caps P4 G 12 are level with respect to the stop shanks of the two lateral segment brackets.

A paper feeler 0,08 mm. (0.0031 of an inch.) thick should be held between the parts making contact.

If necessary adjust the position of the right hand regulator; the left hand regulator should not be touched.

P4 G 9	Shift shaft with arms	UG 805	Jig for regulating the segment for " small letters "
P4 G 11	Shift regulator		
P4 G 12	Rubber cap for shift regulator	138 40 5	Hexagonal nut for P4 G 11

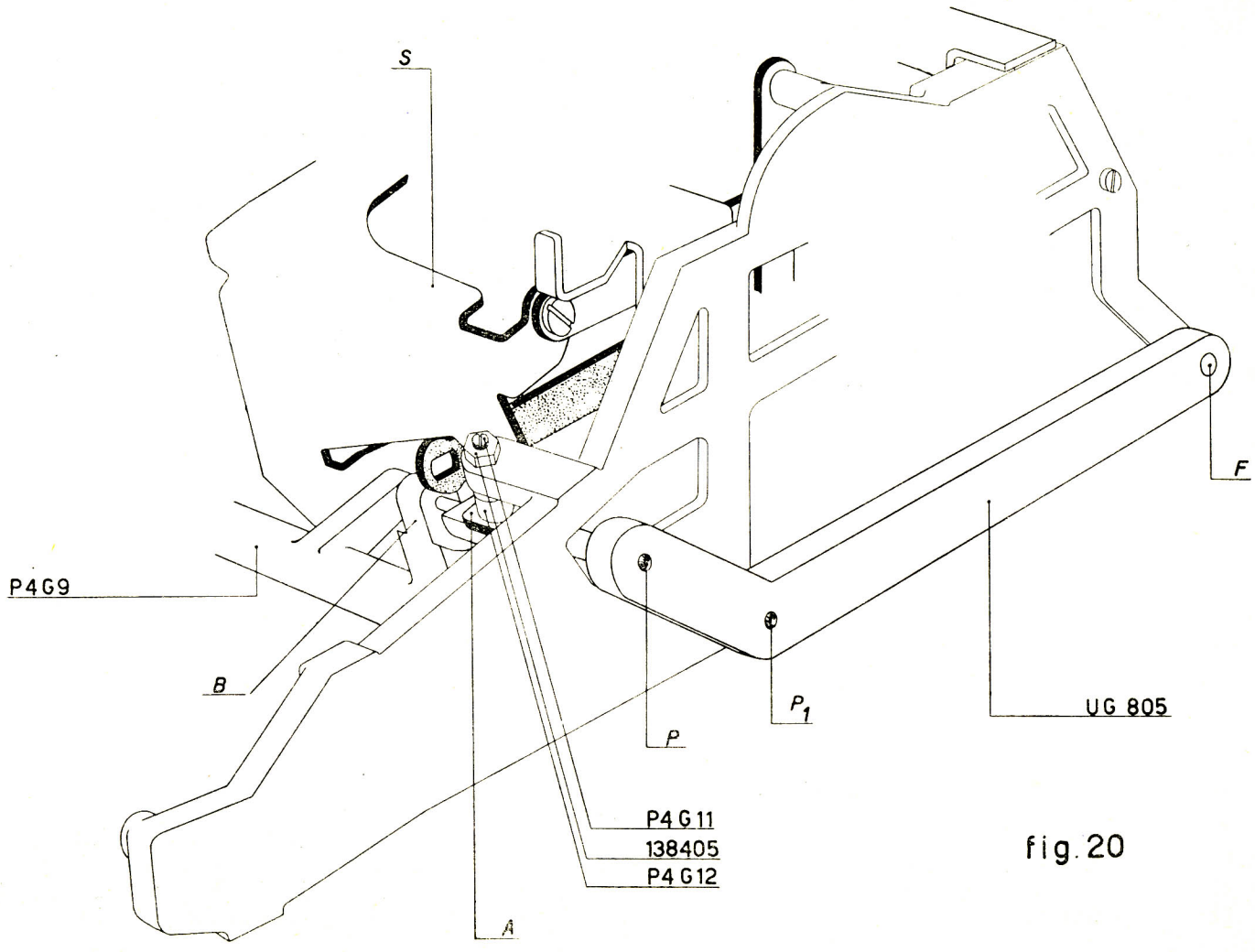


fig. 20

23 - FIGURE 21

a) Leave the type bar segment in position for small letters.

b) A 6,6 mm. (0.25984 of an inch.) feeler (UG 802/33) should pass not too easily between the lower rubber cap P4 G 12 and shank **A** of the left hand bracket **S** of the type bar segment. This condition is reached by moving the lower regulator as required.

c) The same operation must be carried out between the lower rubber cap on the right and the stop shank of the right hand bracket of the type bar segment.

N. B. The thickness of 6,6 mm. (0,25984 of an inch.) represents the distance travelled by the type bar segment from the position for small letters to the position for capitals.

24 - FIGURES 22 and 22a

a) Hook spring P4 G 13 between the lower bend of the left hand spool shaft bracket P4 L 15 and the rear bend of the left hand lever of the shift frame P4 GG 3.

b) Connect the shift pull rod P4 G 4 to arm **B** of shaft P4 G 9 with the eccentric stud M3 Q 10 and nut 138 30 5.

c) Adjust the eccentric M3 Q 10 temporarily so that during the shift, the lower shank **A** of rod P4 E 15 does not foul the back bend of the left hand lever of shift frame P4 GG 3; use a nut 138 30 5 which should not be screwed down tightly.

P4 E 15	Left hand typebar segment suspension rod
P4 G 4	Shift pull rod
P4 G 9	Shift shaft with arms
P4 G 11	Shift regulator
P4 G 12	Rubber cap
P4 G 13	Spring for P4 GG 3
P4 GG 3	Shift frame
P4 EL 15	Left hand spool shaft bracket
M3 Q 10	Connecting stud for P4 G 4
UG 802/33	Feeler for checking segment travel
138 30 5	Hexagonal nut for M3 Q 10

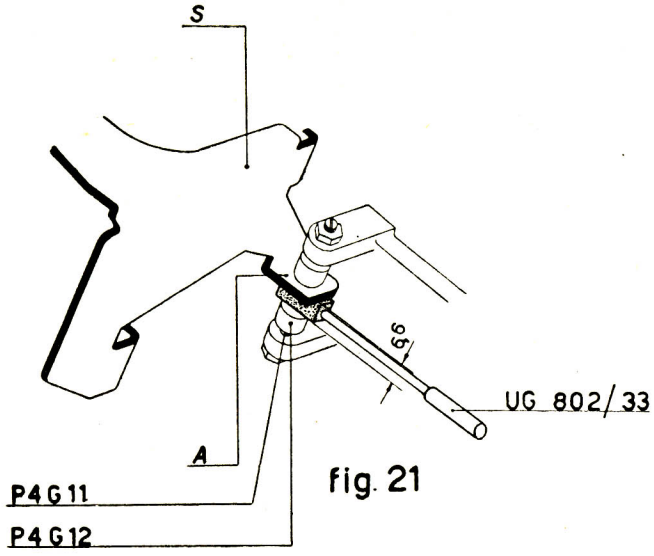


fig. 21

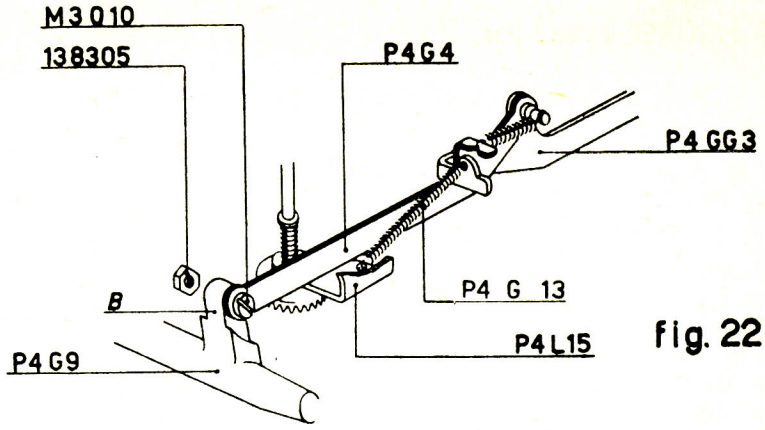


fig. 22

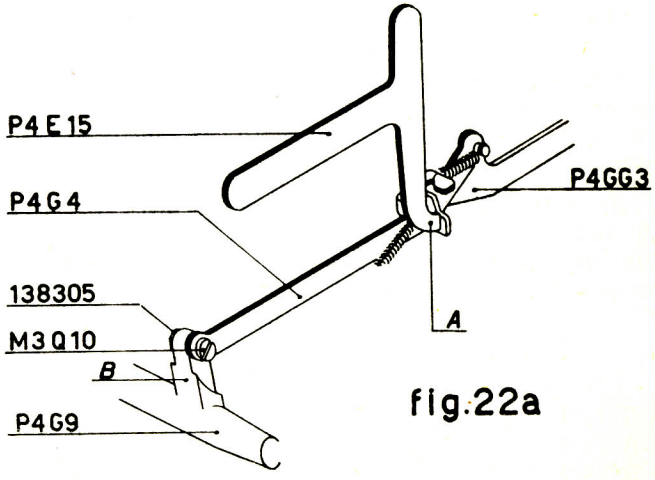


fig.22a

25 - FIGURES 23 and 23a

a) Place the machine with the right hand side on the work bench and the keyboard facing the right.

b) Proceed with the hooking up of the first movement links P4 B 24/... and the assembly of the second movement levers P4 B 26 in the following order:

— hook a first movement link P4 B 24/... to first movement lever P4 B 23/1, i. e. the first on the left. The eye of the link, as seen in the figure, should be turned towards the outside of the machine. Its bend should be turned towards the operator; the links for first movement levers P4 B 24/2 of 8 and 9 levers must be crossed (page 99);

— hook a second movement lever P4 B 26 to the other eye of the link P4 B 24/... Lodge the lever in the corresponding guide slot of the type bar segment.

c) Starting with the second of the first movement levers P4 B 23/2 and continuing to the twenty-second P4 B 23/22 (corresponding to the letter h on the standard keyboard) the hooking up of the links is in the opposite direction. Their bends, however, should always be turned towards the operator.

d) Insert the temporary wire pin UA 8058/9 (2.6 mm.—7/64"—diameter) and advance it little by little until the twenty-two second movements levers now mounted are hinged on it.

e) Place the machine on ist left hand side with the keyboard facing the left. Assemble the twenty-one second movement links and the twenty-one levers in the same order as given above. The first link of the first movement lever P4 B 23/43 should have its loops turned towards the outside of the machine. The other twenty-one links should be hooked on in the opposite direction. Their bends should always be turned towards the operator.

f) Advance the temporary wire pin further so that the forty-three first movement levers are hinged on it. Then introduce the proper wire pin P4 B 29, and withdraw the temporary one at the same time.

g) Turn the plates P4 E 28 S and P4 E 28 D, previously placed in position, until they reach the position shown in figure 23a. The wire pin P4 B 29 is thus locked in its seat. Screw up tightly screws 126 30 42.

26 -

Assemble in correct order on the levers composing the keyboard:

— the back space key P3 GN 12;
— the margin release key P3 Q 11;
— the tabulator key P3 V 4;
— the two shift keys M2 G 25;
— the shift lock key M2 G 26;
— the forty-three caps M2 GB 30.

P4 B 23/1 ÷ 43	First movement levers
P4 B 24/1	Links for first movement levers
P4 B 24/2	Links for first movement levers (8 and 9
P4 B 26	Second movement levers

P4 B 29	Wire pin for second movement levers
P4 E 28 S	Wire pin anchor plate - left hand
P4 E 28 D	Wire pin anchor plate - right hand
126 30 42	Threaded pin for P4 E 28 S and P4 E 28 D

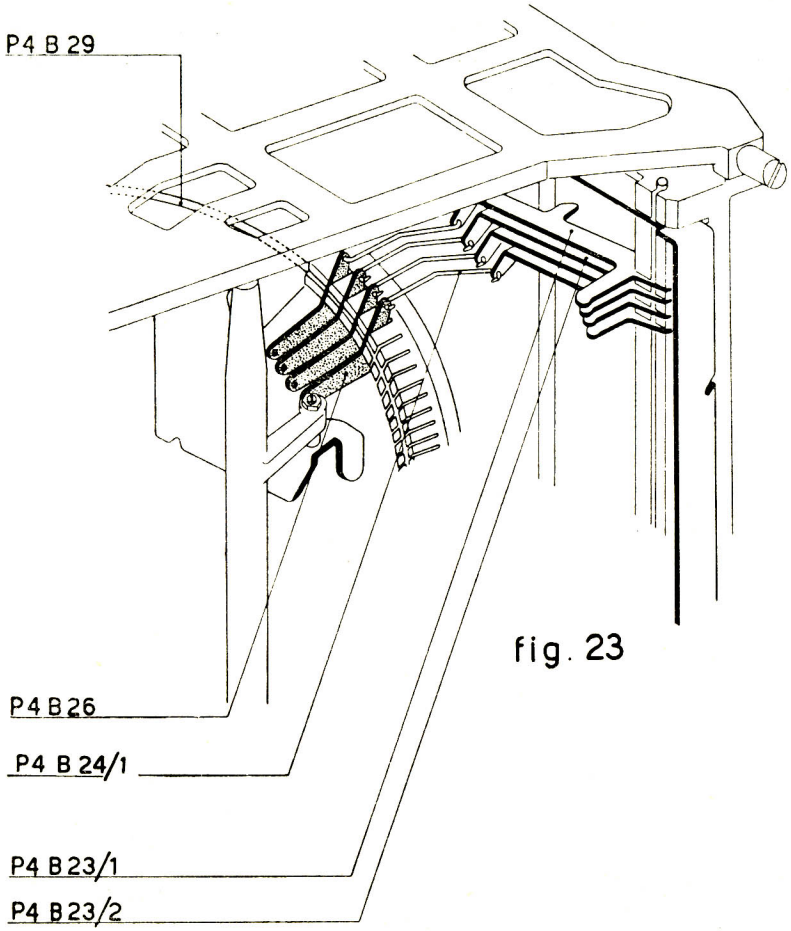


fig. 23

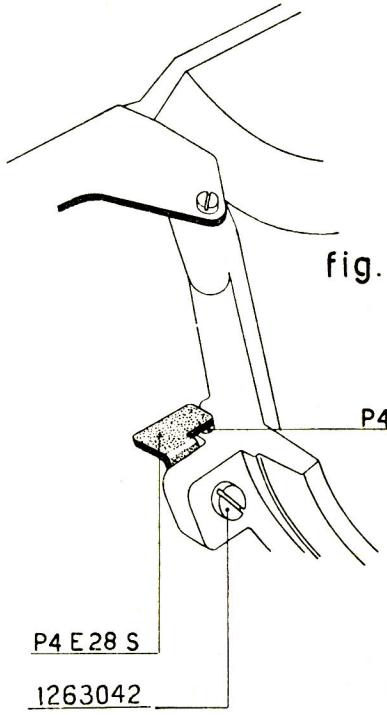


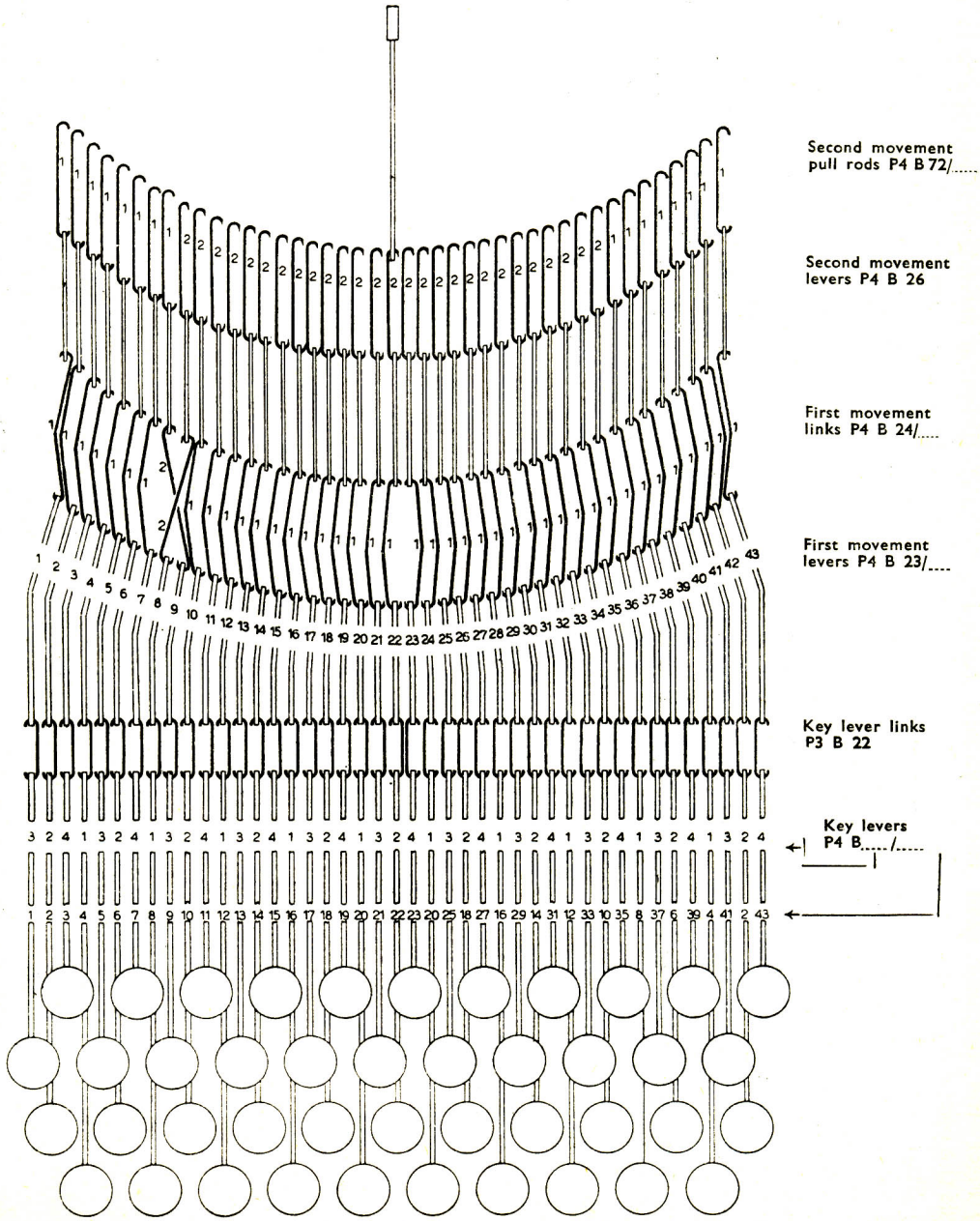
fig. 23a

27 -

Hooking up the second movement pull rods and assembling the type bars. The second movement pull rods are of two types: the standard P4 B 27/1 and P4 B 27/2 with the small milled hook. The standard ones are assembled on the lateral cinematic movements on the first eight on the left and on the last eight on the right. The pull rods P4 B 27/2 are used for the other twenty-seven cinematic movements.

There are forty-three type bars; they are numbered progressively starting from the left. Their base code symbol is P4 E 3/... followed by the figure which identifies their position.

P4 B 23/1 ÷ 43	First movement levers
P4 B 24/1	First movement links
P4 B 24/2	Links for first movement levers 8 and 9
P4 B 26	Second movement levers
P4 B 27/1	Second movement pull rods for keys 1 ÷ 8 and 36 ÷ 43
P4 B 27/2	Second movement pull rods for keys 9 ÷ 35
P3 B 22	Key lever links


Second movement pull rods P4 B 72/.....
Second movement levers P4 B 26
First movement links P4 B 24/....
First movement levers P4 B 23/....
Key lever links P3 B 22
Key levers P4 B...../.....

a) Place the machine with the keyboard turned towards the operator.

b) Start assembling beginning with the first cinematic movement on the right. Proceed in the following order:

— lower the key so as to raise the second movement lever P4 B 26;

— hook the second movement pull rod on to it, in the direction shown in the figure;

— hook the other eye of the pull rod, to the corresponding type bar;

— keep the key lowered and insert the type bar in the corresponding guide slot of the segment;

— introduce and advance the temporary wire pin UA 8058/8 until the type bar already in position is hinged on it.

c) Continue assembling the type bars in the same order, proceeding towards the left.

d) Replace the temporary wire pin with permanent pin P4 E 2.

e) Check the perfect freedom of movement of each type bar, in its guide slot. Also check that each type bar reaches the type guide without obstruction.

f) Loosen the rear screws 120 35 4 which hold the lateral bracket to the type bar segment (figure 24a).

Place the wire pin anchor plate P4 E 27 under these screws in the direction indicated in the same figure. Tighten up screws 120 35 4.

The wire pin for the type bars is thus locked in position.

P4 B 26	Second movement levers
P4 B 27/1	Second movement pull rods for keys 1 ÷ 8 and 36 ÷ 43
P4 B 27/2	Second movement pull rods for keys 9 ÷ 35
P4 E 2	Wire pin for type bars
P4 E 3/1 ÷ 43	Type bars
P4 E 5	Type bar rest bearing
P4 E 13	Metal stop plate
P4 E 27	Wire pin anchor plate
E 11	Type
120 35 4	Cheese head screw for P4 E 27
125 30 36	Special screw for P4 GE 12
32 26 1	Dowel pin for P4 GE 12

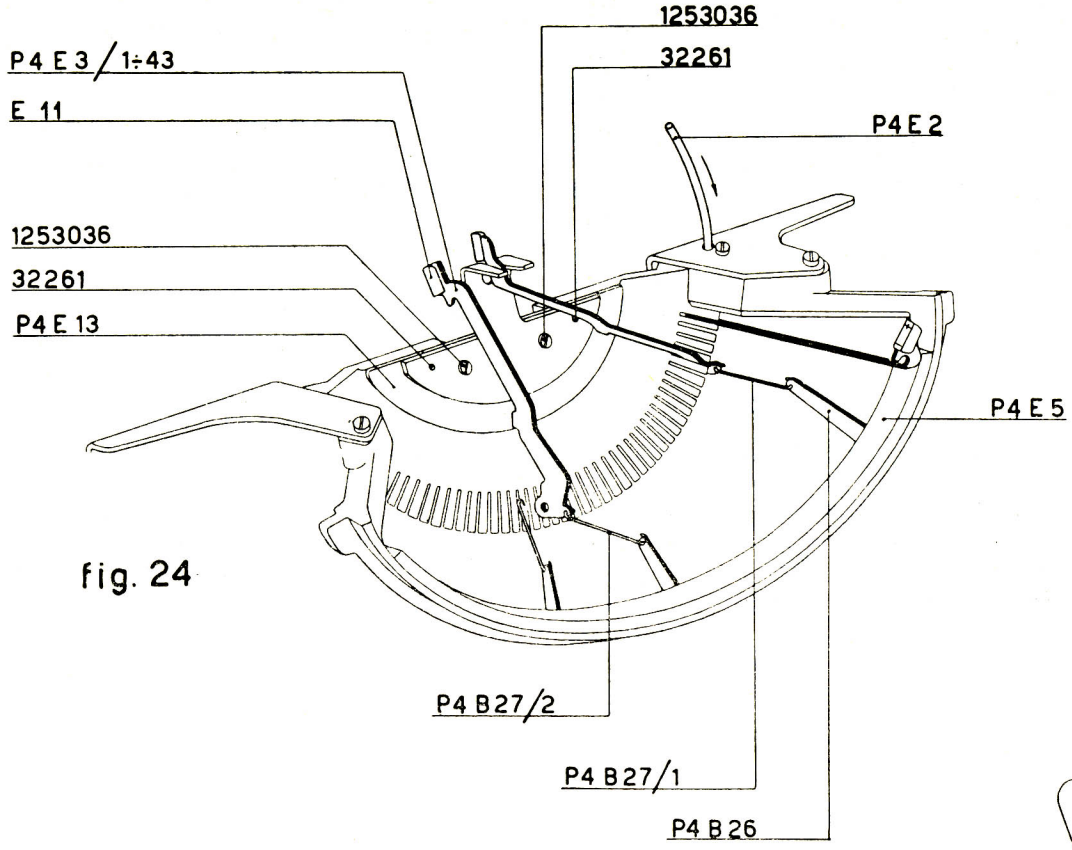


fig. 24

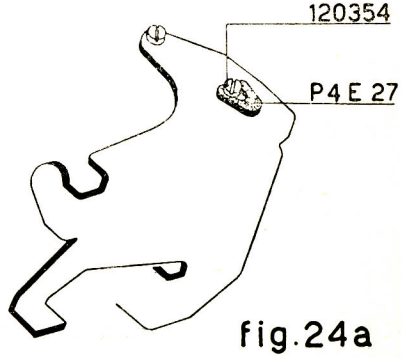


fig.24a

28 - FIGURE 25

a) Place the machine in the position shown in the figure.

b) Place the connecting cross piece P4 E 4 on the two lateral brackets of the type bar segment. Its front shank should barely touch the wire pin of the second movement levers. The slot should be centered in relation to the middle second movement lever.

Secure the cross piece with two screws 120 30 3 with the washer 40 31 2.

29 - FIGURE 26

Adjusting the cinematic chain.

a) First of all, operate the shift. If on changing from small letters to capitals and vice versa, some of the type bars remain on the felt rest, it means that the connecting cross piece P4 E 4 is pressing on the segment. An adjustment must be made so that its front shank is kept slightly away from the wire pin of the second movement levers.

b) The positioning of the cinematic chain is correct when:

— the type bars reach the platen on striking the keys lightly;

— the type bars rest on the felt support in both the capitals and small letter positions;

— if the type bar is held back, the corresponding key makes an idle stroke of 1 ÷ 1,5 mm. (0,04 ÷ 0.055 of an inch.);

— if the type bar in a cinematic chain does not reach the platen, it means that the corresponding key has too great an idle stroke and the bend of the first movement link P4 B 24/... must be decreased by means of a hand setting tool.

The same operation must be carried out even if the type bar reaches the platen when the corresponding key has a greater idle stroke than stated. If on changing from small letters to capitals and vice versa, the type bar remain on the felt, it means that the keys have no idle stroke. It is then necessary to increase, with the aid of the hand setting tool, the bend in the first movement link P4 B 24.

P4 B 24/...	First movement link
P4 E 4	Connecting cross piece
M2 GB 30/...	Key tops

120 30 3	Cheese had screw for P4 E 4
40 31 2	Washer for 120 30 3

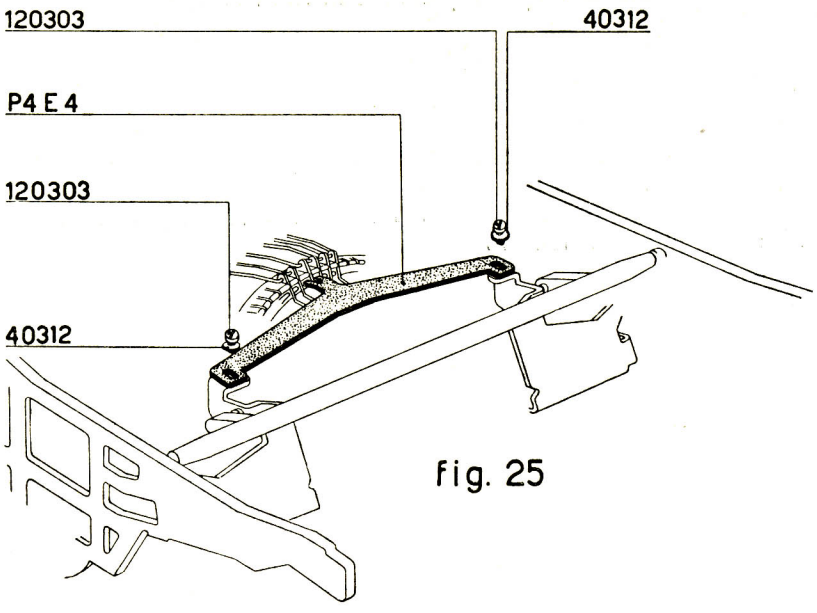


fig. 25

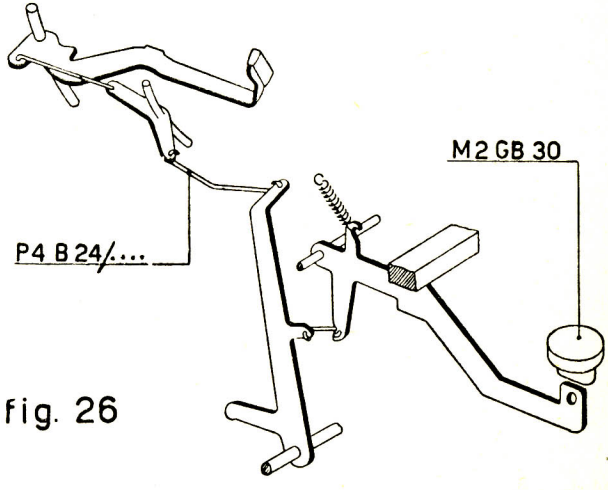


fig. 26

30 - FIGURES 27 and 27a

Fit the two ribbon feed springs P4 L 104 on the right hand pinion of the ribbon feed P4 GL 15, to their corresponding anchorages. Position them as indicated in the figure and be very careful when assembling them not to subject them to the slightest distortion.

Turn the springs to close their coils and check that the pinion is pulled by the rotation.

Fit the assembled pinion in the ribbon feed frame P4 L 103. The bent end of the outer spring should be inserted into the hole specially drilled in the frame.

31 - FIGURE 28

On the ribbon feed horizontal shaft P4 L 8, place in the following order:

— the left hand ribbon feed pinion P3 L 33 with its screw 124 30 7;

— the circular cam for the reverse trip P3 L 31 with its screw 124 30 7.

P4 L 8	Ribbon feed horixontal shaft
P4 L 103	Ribbon feed frame
P4 L 104	Ribbon feed spring
P4 GL 105	Right hand ribbon feed pinion complete
P3 L 31	Circular cam for reverse trip
P3 L 33	Left hand ribbon feed pinion
124 30 7	Grub screw for P3 L 33 - P3 L 31 - P4 GL 105

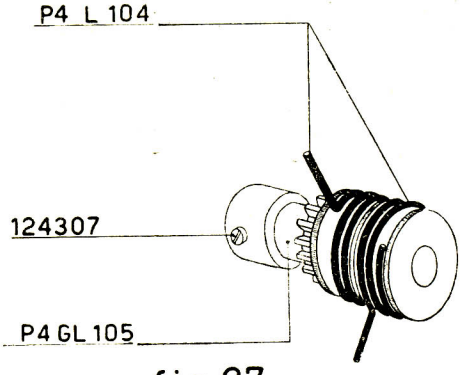


fig. 27

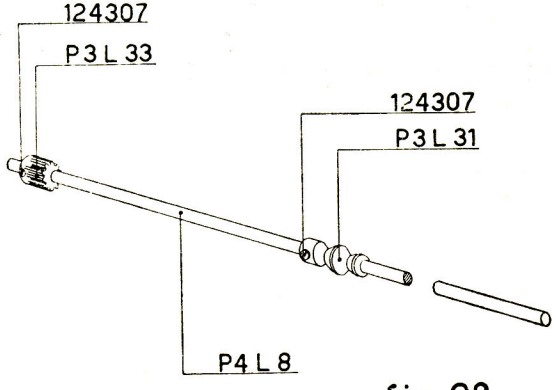


fig. 28

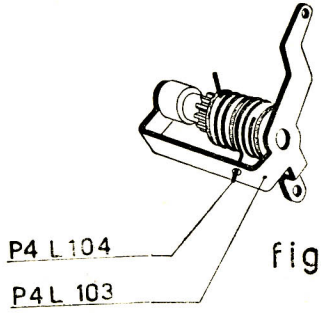


fig. 27a

32 - FIGURES 29 and 30

a) Position the unit formed by the right hand pinion P4 GL 105 and the frame P4 L 103 in relation to the ribbon feed crown wheel of the right hand ribbon carrying unit.

Hook pull rod P3 L 2 to the frame P4 L 103.

b) Arrange the bent end of the inner spring P4 L 104 in the special slot **A** filed in one of the shanks of the right hand ribbon carrying shaft bracket P4 EL 16.

c) Fit the right hand end of the shaft P4 L 8 in the frame P4 L 103 and the pinion P4 GL 105. Advance this shaft further so that it is inserted in the special guide opening made in the right hand side member of the machine.

d) The left hand end of the shaft P4 L 8 is lodged in the corresponding opening made in the left hand side member of the machine.

e) Connect the two lugs controlling the ribbon reverse **B** and **B1** with the pull rod P4 L 27.

f) Hook spring 60 20 9 between the frame P4 L 103 and the right hand spool shaft bracket P4 EL 16.

P4 L 8	Horizontal ribbon feed shaft
P4 L 27	Lug connecting pull rod
P4 L 103	Ribbon feed frame
P4 L 104	Ribbon feed spring
P4 EL 16	Right hand spool shaft bracket
P4 GL 105	Right hand ribbon feed pinion complete
P3 L 2	Pull rod controlling ribbon feed
60 20 9	Spring for P4 L 103

fig. 29

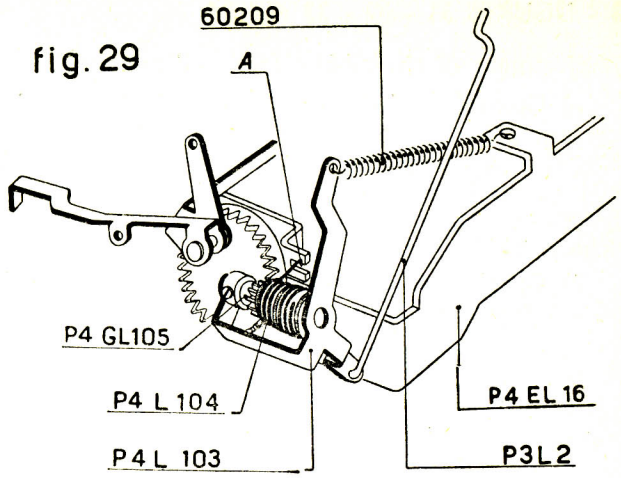
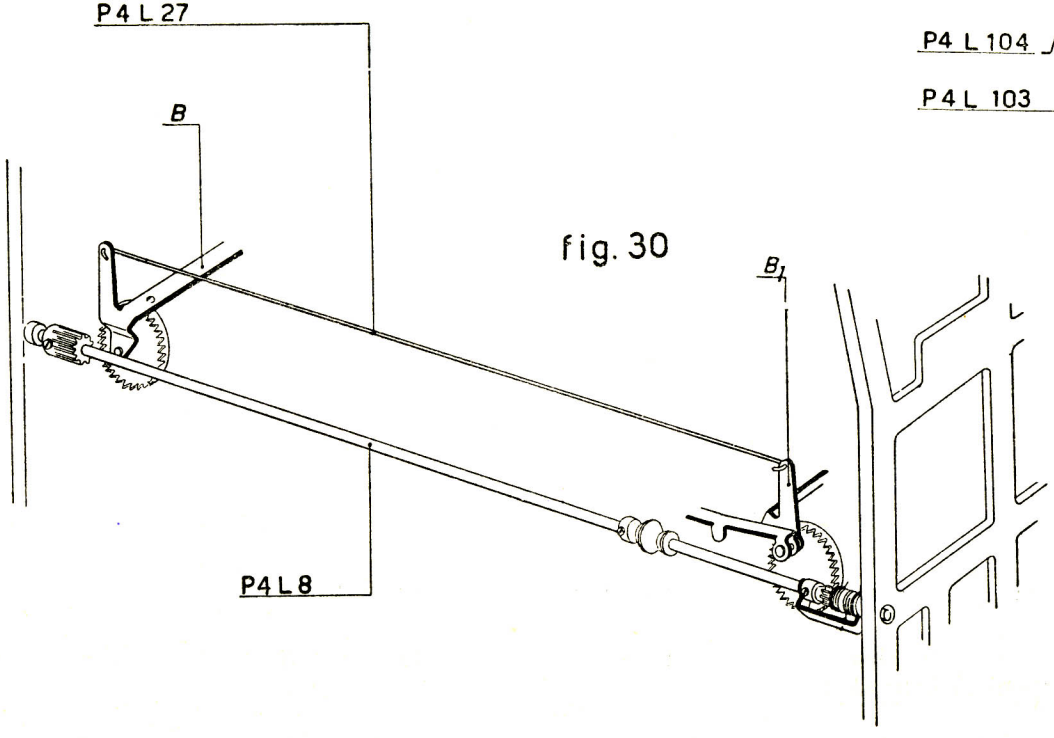


fig. 30



33 - FIGURES 31 - 32 - 33 and 34

Adjustment of the ribbon feed and reverse.

a) Centralise shaft P4 L 8 in relation to the side members of the machine. With the shaft in this position, bring the pinion P3 L 33 and the frame P4 L 103 to 1 mm. (0.04 of an inch.) of the respective sides (figure 31). Tighten screws of pinion P3 L 33 and P4 GL 105 partially without locking them.

b) Check the reciprocal position of the two lugs **B** and **B1** (figure 32). It should be the right hand lug **B** which stops against the corresponding bracket P4 L 16. In the two positions, the left hand lug **B1** should have a safety clearance from the corresponding bracket P4 EL 15. This clearance should be the same from both sides.

This condition obtains in almost every case. If required, it can be attained by correcting the angle between the upper and lower arms of the right hand lug **B**. If this has to be done, check again afterwards on the rotational freedom of the lug and in addition, make sure that its axial play is a minimum.

P4 L 8	Horizontal ribbon feed shaft
P4 L 103	Ribbon feed frame
P4 EL 15	Left hand spool shaft bracket
P4 EL 16	Right hand spool shaft bracket
P4 GL 105	Right hand ribbon feed pinion complete
P3 L 33	Left hand ribbon feed pinion

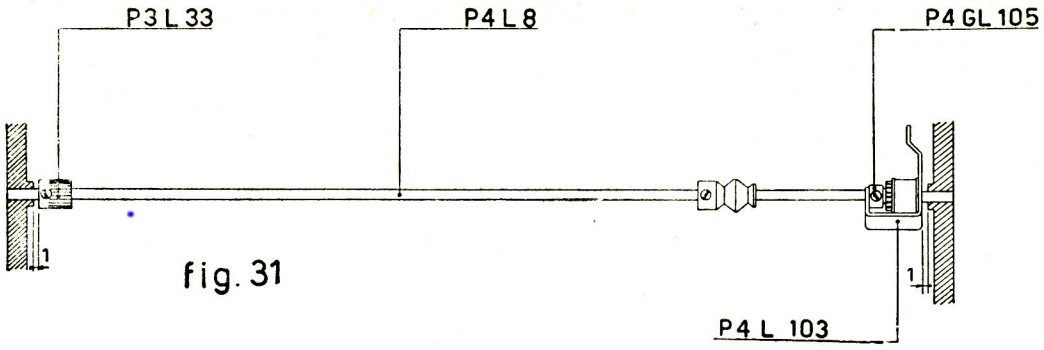


fig. 31

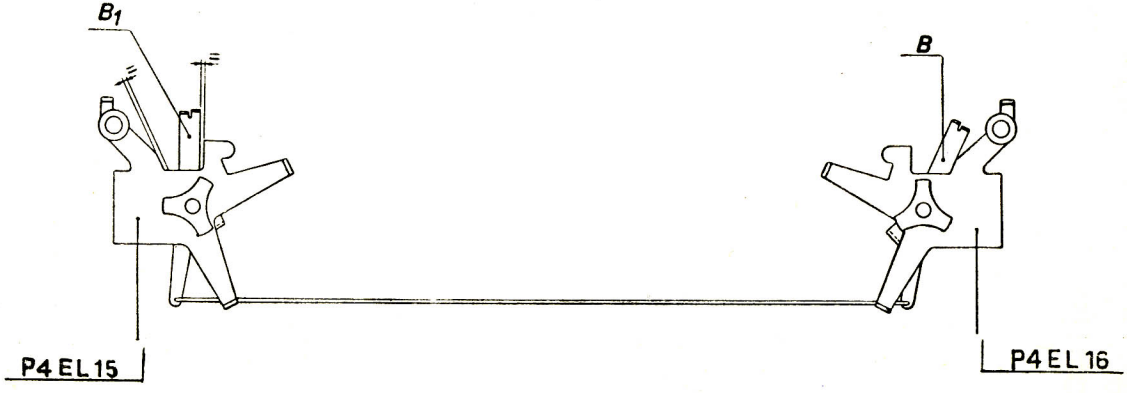


fig. 32

c) Hook spring 63 30 4 between the positioning piece **P** and the hook **G** of the right hand spool bracket.

Move shaft P4 L 8 to the right so that the frame P4 L 103 touches the right hand side member of the machine.

The left hand pinion P3 L 33 will mesh with the corresponding crown wheel P3 GL 11 (figure 33).

Check that the teeth of the pinion P3 L 33 engage the entire width of the teeth of crown wheel P3 GL 11. If necessary, correct the position of the pinion in relation to shaft P4 L 8.

d) Move the pull rod P4 L 27 in the direction shown by the arrow, so that the lug of the ribbon carrying unit contacts the corresponding bracket.

Move the circular cam for the reverse trip P3 L 31 along shaft P4 L 8 as required. It should take the position shown in figure 33. The left hand collar should be centered in relation to the bend in the position piece **P**.

Check that the latter rests on leg **G1** of the right hand ribbon carrying bracket; there should be a safety clearance of 0,2 mm. (0.008 of an inch.) between the bent end and the bottom of the collar groove of cam P3 L 31. If necessary, adjust the bend in leg **G1** with moderate pressure.

Taking up the play of shaft P4 L 8, and play allowed by cam P3 L 31, check that pinion P3 L 33 does not slip out of the crown wheel P3 GL 11.

e) Check the meshing between the pinion P3 L 33 and crown wheel P3 GL 11. They should engage about half the depth of a tooth.

If the meshing is not found to be as stated (figure 34):

— raise or lower the lower bend **P** of bracket P4 EL 15 and raise or lower the crown wheel P3 GL 11 the same amount. In this way the axial play of 0,6 mm. (0.024 of an inch.) prescribed for the left hand shaft P4 EL 12 remains unaltered.

f) Operate the ribbon reverse, moving the lug as required. The engagement is now on the right. Repeat the same series of operations and checks, as given, for the left hand side engagement.

N. B. Remember that the axial play of shaft P4 EL 12 of the ribbon carrying unit should be 0,05 mm. (0.002 of an inch.).

P4 L 8	Horizontal ribbon feed shaft
P4 L 27	Pull rod connecting lugs
P4 L 103	Ribbon feed frame
P4 EL 12	Spool shaft with plate
P4 EL 15	Left hand spool shaft bracket
P3 L 19	Button securing spool
P3 L 31	Circular cam for reverse trip
P3 L 33	Left hand ribbon feed pinion
P3 L 63	Spool braking spring
P3 GL 11	Ribbon feed crown wheel
124 30 7	Grub screw for P3 L 31
63 30 4	Spring for P4 L 29

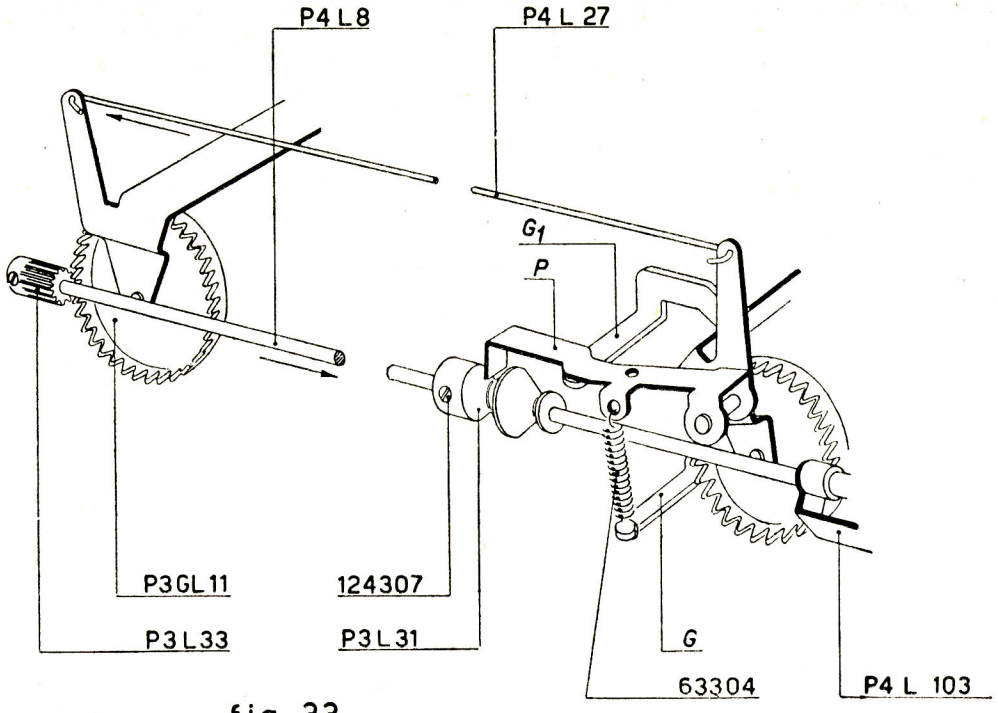

P4 L8
P4 L 27
G1
P
P3GL11
124307
P3L33
P3L31
G
63304
P4 L 103

fig. 33

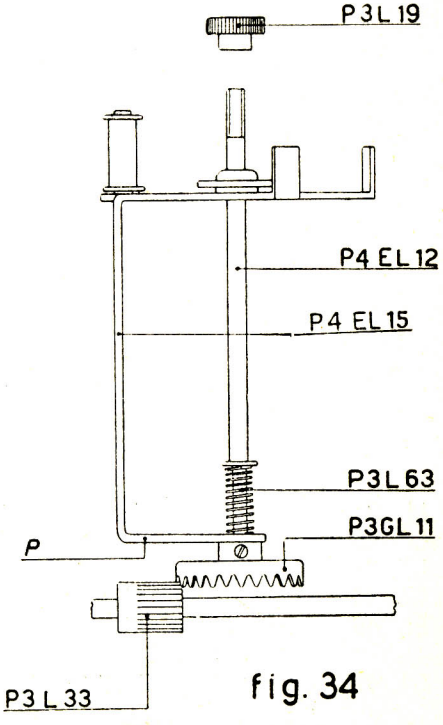

P3L19
P4 EL12
P4 EL15
P3L63
P3GL11
P
P3L33

fig. 34

34 - FIGURES 35 and 36

a) Place in the following order on the ribbon carrier shaft P4 L 48:

— collar 142 51 6 with corresponding screw 120 30 14;

— the space bar control frame P4 H 3;

— the second crank of the ribbon carrier P4 GL 49 with corresponding screw 125 30 26;

— the clamp of the first ribbon carrier crank and pull rod P4 EL 46 with corresponding screw 125 30 26.

b) Hook the spring P4 L 52 between the pull rod P4 EL 46 and the flexible coupling.

c) Screw two conical pivot screws 129 40 4 with their nuts 138 40 5 on to the two side members of the machine. Place shaft P4 L 48 ready assembled between these two screws. The crank P4 GL 49 and the pull rod P4 L 46 should be in the positions shown in figure 35. Centre the shaft P4 L 48 between the two sides by adjusting the two regulators 129 40 4 as required. Its axial play should be a minimum and it should rotate with perfect freedom. Having reached this condition, lock both nuts 138 40 5 of pivot screws 129 40 4.

d) Connect the pull rod P4 EL 46 to the two-colour change lever P4 GL 44 with the link P3 B 22 (figure 36).

P4 H 3	Space bar control frame
P4 L 48	Ribbon carrier shaft
P4 L 52	Spring for P4 EL 46
P4 GL 44	Two-colour change lever
P4 EL 46	First ribbon carrier crank with pull rod
P4 GL 49	Second ribbon carrier crank

P3 B 22	Links for key levers
120 30 14	Cheese head screw for 142 51 6
125 30 26	Special screw for P4 GL 49 - P4 EL 46
129 40 4	Conical pivot screw for P4 L 48
138 40 5	Hexagonal nut for 129 40 4
142 51 6	Collar for P4 H 3

fig. 35

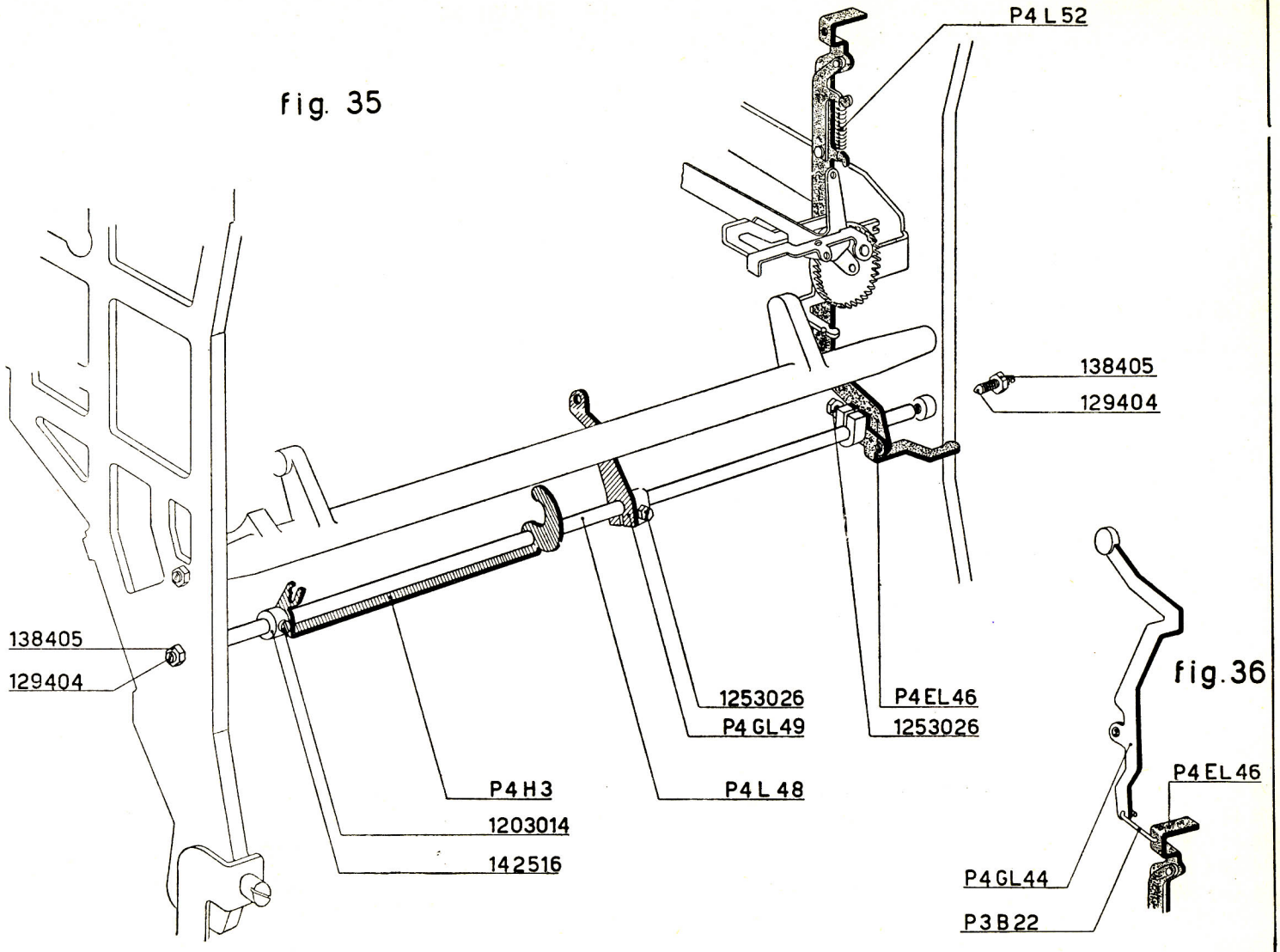

P4 L 52
138405
129404
138405
129404
1253026
P4 GL49
P4 EL 46
1253026
P4 H3
1203014
142516
P4 L 48

fig. 36

P4 EL 46
P4 GL44
P3 B 22

35 - FIGURE 37

Connect the lever P4 GH 7 to the space bar frame P4 H 3 by means of link P4 H 8. The latter should be placed as shown in the figure. Close the slots of P4 H 3 and P4 GH 7 with pliers so as to secure the link.

Move lug **B** of the left hand ribbon carrying unit counter clockwise. Check that it does not foul link P4 H 8. Adjust the collar 124 51 6 if necessary. A spring which will be hooked in later, will hold frame P4 H 3 in contact with the collar.

Furthermore, make sure that the inside shank of frame P4 H 3 is engaged with stop **A** of the universal frame P4 GE 20. Tighten screw 120 30 14 of collar 142 51 6.

P4 GE 20	Universal frame complete
P4 H 3	Space bar control frame
P4 H 8	Spacer link
P4 GH 7	Spacer control lever
P4 GL 49	Second ribbon carrier crank

36 - FIGURE 38

a) Place the ribbon carrier P4 GL 51 in position on the special rear pin of the type guide. Place its lower leg in the hole in second ribbon lift crank P4 GL 49. Secure it with a flexible clip 45 22 1.

b) Check that screw 125 30 26 of crank P4 GL 49 is loose and that the crank itself is free to rotate on its shaft.

c) Check that the movement of the ribbon carrier is perfectly free.

P4 GL 51	Ribbon carrier
120 30 14	Cheese head screw for 142 51 6
125 30 26	Special screw for P4 GL 49
142 51 6	Collar for P4 H 3
45 22 1	Flexible clip for P4 GL 51

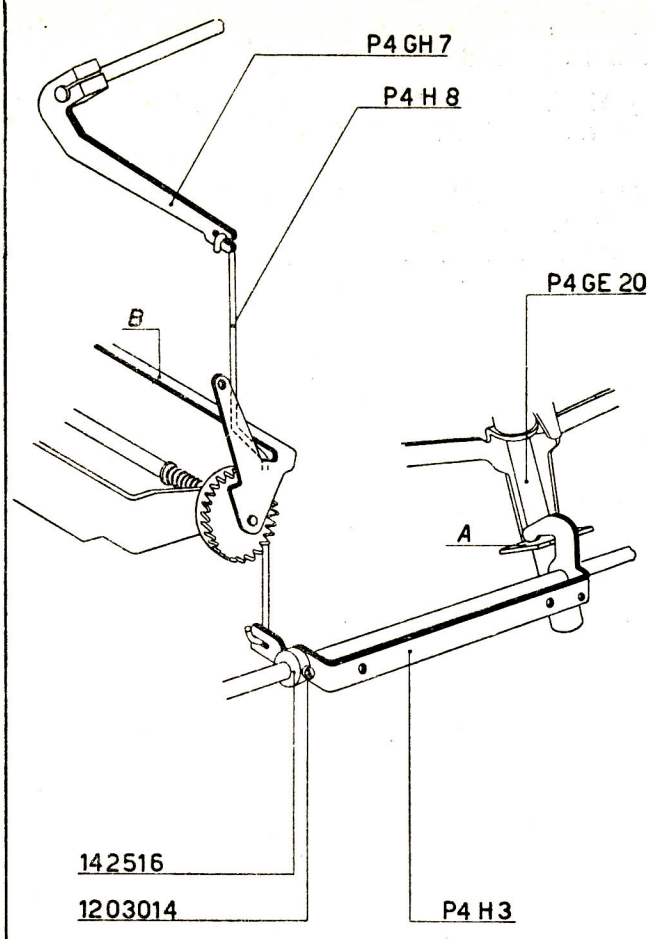

P4 GH 7
P4 H 8
P4 GE 20
B
A
142516
1203014
P4 H 3

fig. 37

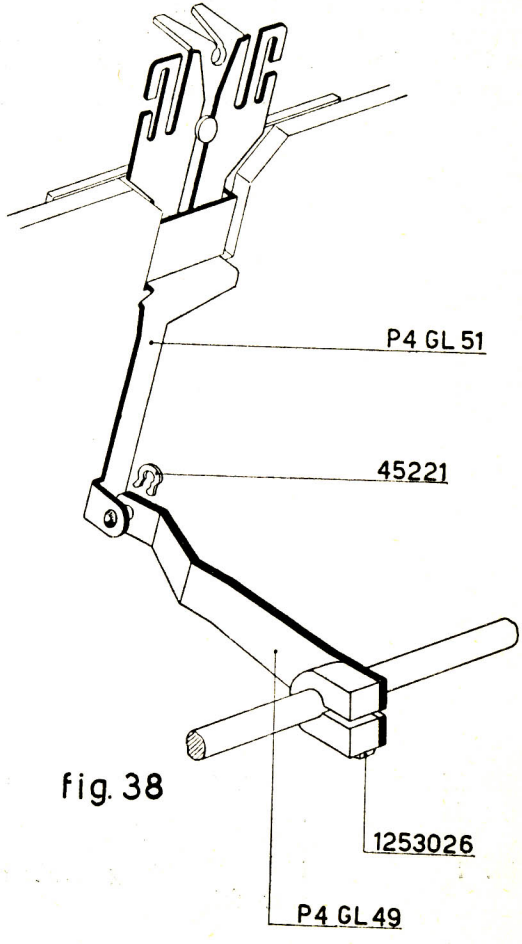

P4 GL 51
45221
1253026
P4 GL 49

fig. 38

37 - FIGURES 39 - 39a and 39b

a) Hook the pull rod P3 L 2 to the right arm of the lug controlling the ribbon movement P4 BL 1 and place the latter in position between the two sides of the machine. The slot of the right arm is fitted on pin **P** of pull rod P4 EL 46. Secure lug P4 BL 1 on the left hand side with stud 126 30 41 and on the right hand side with stud 126 3033.

b) Check that the rear shanks of the first movement levers rest on the lug. If necessary adjust so that the latter is made level.

c) Hook spring P4 L 14 between the left arm of the lug and the crank P4 GB 31 (figure 39b).

38 - Mount the ribbon spools on their small shafts and secure them with the buttons P3 L 19. Arrange ribbon in the ribbon carrier. Test ribbon feed and reverse.

P4 GB 31	Crank for touch control spring
P4 L 14	Spring for lug
P4 L 103	Ribbon feed frame
P4 BL 1	Lug controlling ribbon movement with felt
P4 EL 46	1st ribbon carrier crank with pull rod
P3 L 2	Pull rod controlling ribbon feed
126 30 33	Threaded pin for P4 BL 1
126 30 41	Threaded pin for P4 BL 1

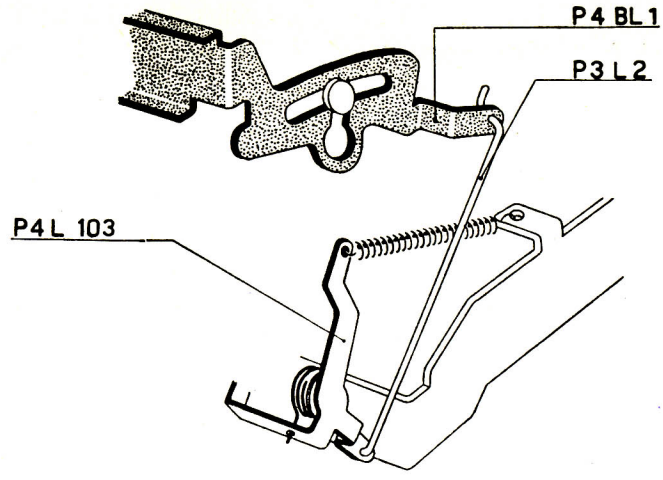


fig. 39a

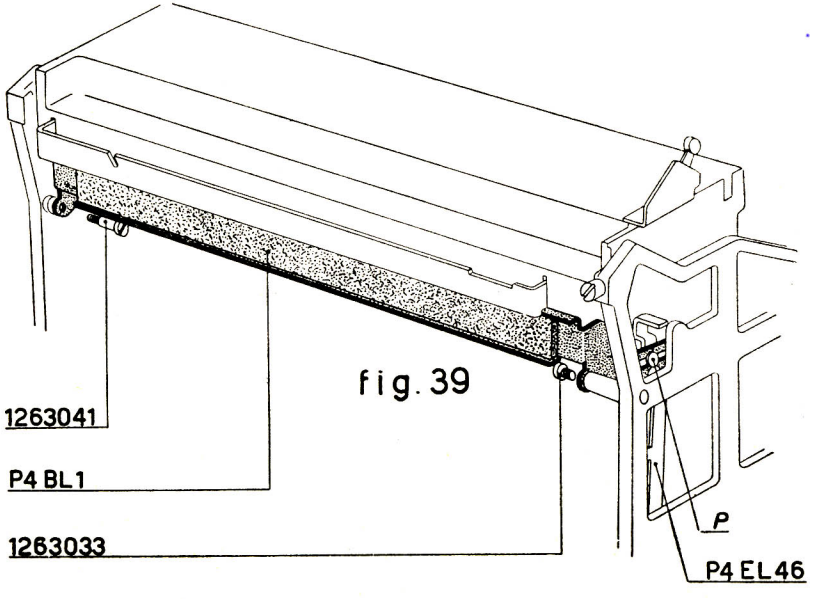


fig. 39

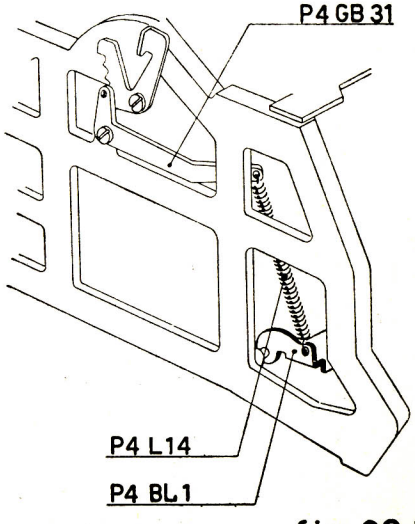


fig. 39 b

39 - FIGURE 40 - 40a and 41

a) On tabulator controlling shaft P4 V 15 mount in the following order:

— the setting and clearing crank P4 GV 23 with its screw 125 30 26;

— the margin release bracket P4 Q 2 is placed astride the crank;

— the clearing and setting control P4 GV 30 with its screw 125 30 26;

— the left hand bent arm of the clearer P4 V 41;

— the setter P4 V 36. Its left arm should be placed beyond the upper extension on the right of the control P4 GV 30;

— the right hand bent arm of the clearer P4 V 41;

— the left hand bent arm of the carriage brake P4 GV 74;

— collar 142 51 6 with its screw 120 30 14;

— the right hand bent arm of the carriage brake P4 GV 74;

— the left hand bent arm of the tabulator frame P4 EV 12;

— collar 142 51 6 with its screw 120 30 14;

— the right hand bent arm of the tabulator frame P4 EV 12.

N. B. The carriage brake P4 GV 74 should have its rear arm placed above the left arm of the tabulator frame P4 EV 12 (figure 40a).

b) Screw two conical pivot screws 129 40 4 on the fixed guide P4 GP 1 (figure 40) with respective nuts 138 40 5. Fix the left screw so that its head is flush with the corresponding nut.

c) Place shaft P4 V 15, ready assembled, between the two above mentioned pivot screws.

Check that the parts assembled on the shaft are in the positions shown in figure 40.

Reduce the axial play of the shaft P4 V 15 to 0,2 mm. (0.008 of an inch.) by adjusting the right hand conical pivot screw 129 40 4. Check that the shaft rotates with perfect freedom.

When this condition has been reached, lock nut 138 40 5 of right hand conical pivot screw 129 40 4.

P4 E 18	Special stud for segment suspension rod
P4 GP 1	Fixed carriage guide with rocker pivot
P4 Q 2	Margin release bracket
P4 V 15	Small tabulator control shaft
P4 V 36	Setter
P4 V 41	Clearer
P4 EV 12	Tabulator frame with bracket
P4 EV 13	Column finger
P4 GV 23	Setting and tabulator crank
P4 GV 30	Clearer and setter control
P4 GV 74	Carriage brake
M2 B 25	Spring for setter and clearer
120 30 14	Screw securing 142 51 6
125 30 26	Special screw for P4 GV 23 - P4 GV 30
129 40 4	Conical pivot screw for P4 V 15
138 40 5	Hexagonal nut for 129 40 4
142 51 6	Collar for P4 GV 74 - P4 EV 12
63 30 4	Spring for P4 EV 13

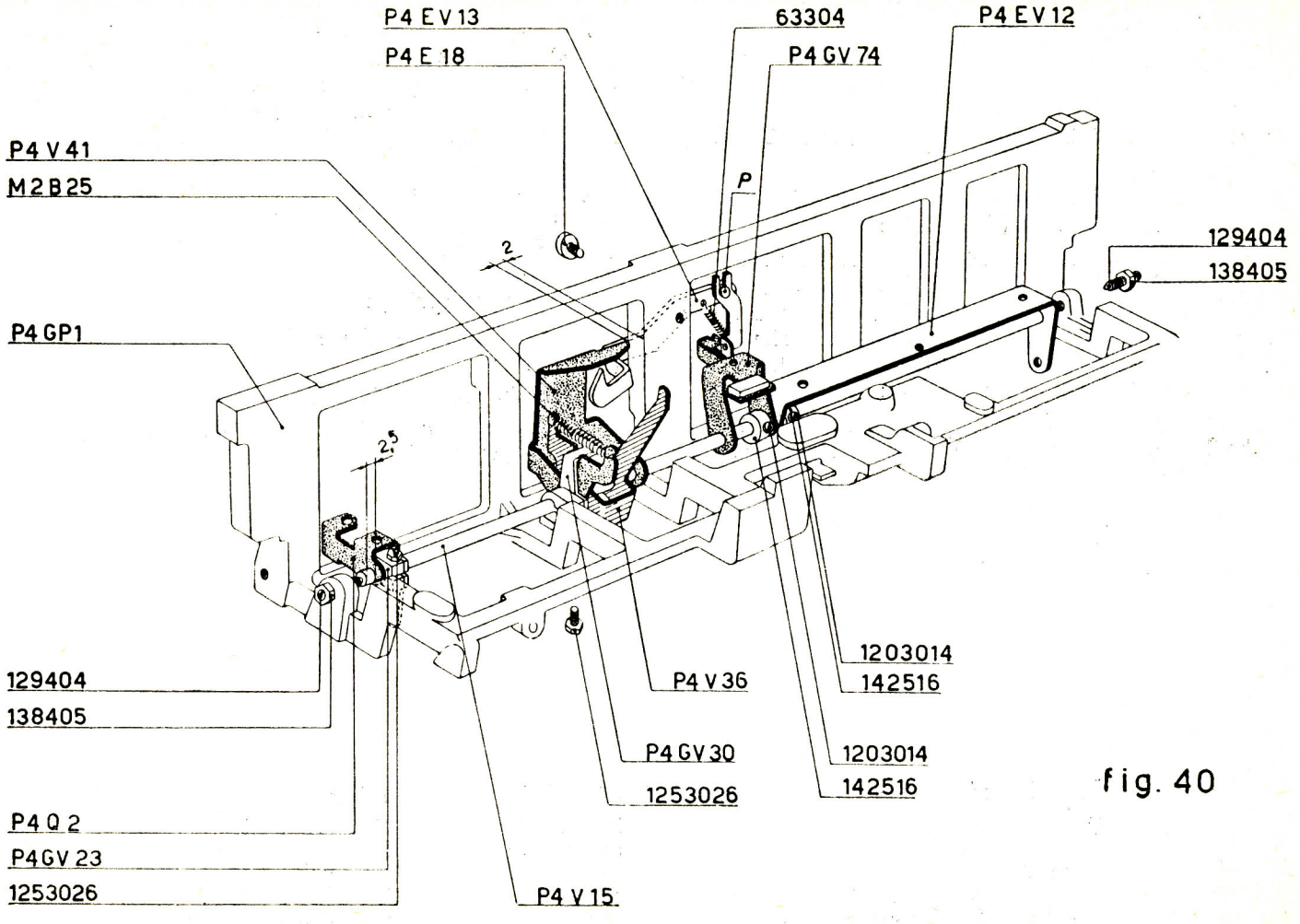

P4 E V 13
P4 E 18
63304
P4 G V 74
P4 E V 12
P4 V 41
M2 B 25
P
2
129404
138405
P4 G P1
2,5
129404
138405
P4 V 36
1203014
142516
P4 G V 30
1253026
1203014
142516
P4 Q 2
P4 G V 23
1253026
P4 V 15

fig. 40

d) Assemble the bracket carrying the stops and spring P4 V 73 on the fixed guide, securing it with two screws 120 30 3 (figure 41). The slot of the bracket should be centred in relation to the screws. Lock the latter.

The setter P4 V 36 and the clearer P4 V 41 rest respectively on the two arms of P4 V 73.

e) Hook spring M2 B 25 between clearer P4 V 41 and setter P4 V 36 (figure 40).

f) Temporarily adjust the axial position of the parts assembled on shaft P4 V 15 (figure 40):

— the margin release bracket P4 Q 2 should have 2,5 mm. (0.1 of an inch.) clearance from the left hand end of the shaft P4 V 15. To obtain this condition, move the crank of the setter and clearer P4 GV 23 as required. The lower leg of the latter should be more or less vertical. Screw in screw 125 30 26 without tightening;

— the left hand end of the upper portion of P4 V 41 should be 2 mm. (0.08 of an inch.) from the adjacent cross piece of the fixed guide. To obtain the required condition, move the setter and clearer control P4 GV 30. When adjusted, screw in screw 125 30 26 without tightening it.

g) Fit the slot of the tabulator frame connecting rod P4 EV 12 on the pin **P** of the tabulator finger P4 EV 13. Secure the latter to the fixed guide with a stud P4 E 18 (figures 40-41). Adjust the connecting rod mentioned so that it is vertical by moving the two collars 142 51 6 as required. Furthermore, the collars must be so placed that the frame P4 EV 12 and the brake P4 GV 74 have a slight axial play which allows them complete rotational freedom.

h) Hook springs:

— 63 30 4 between the rod of P4 EV 12 and P4 EV 13 (figure 40);

— M2 B 25 between P4 V 73 and P4 GV 74 (figure 41);

— 63 50 3 between P4 V 73 and the lower leg of frame P4 EV 12 (figure 41).

P4 E 18	Special stud for segment suspension rod
P4 V 36	Setter
P4 V 41	Clearer
P4 V 73	Stop and spring carrying bracket
P4 EV 12	Tabulator frame with bracket
P4 EV 13	Tabulator finger
P4 GV 74	Carriage brake
M2 B 25	Spring for P4 GV 74
120 30 3	Cheese head screw securing P4 V 73
63 50 3	Spring for P4 EV 12

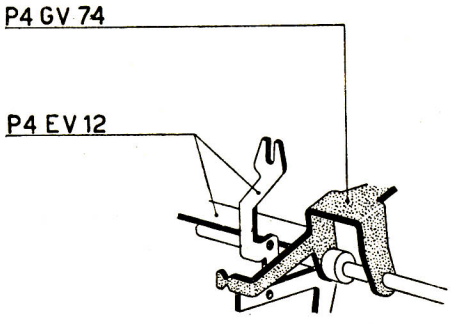


fig. 40a

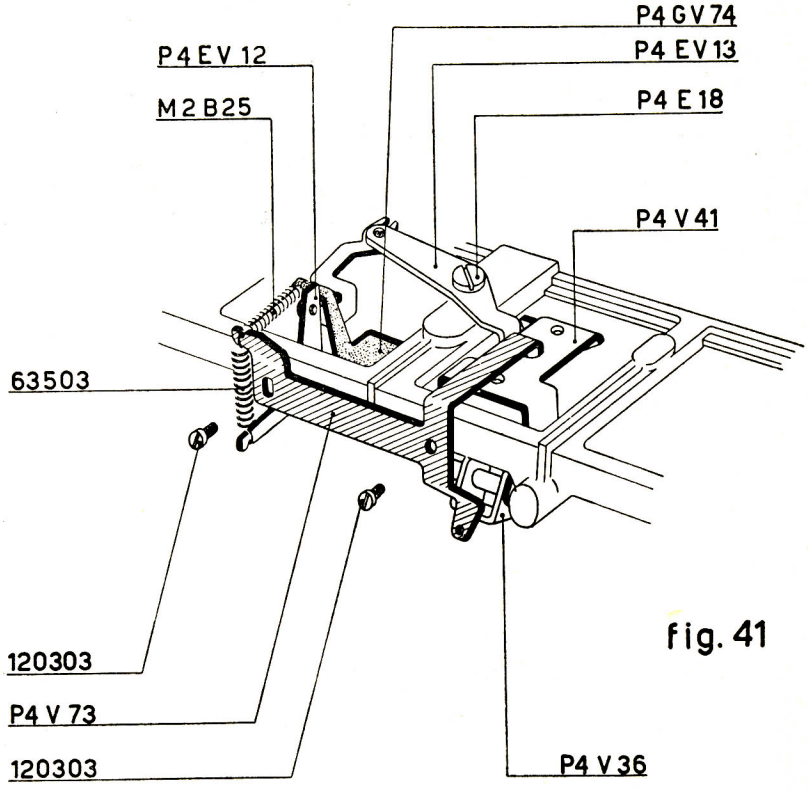


fig. 41

40 - FIGURE 42

a) Assemble on the fixed guide:

— the two lower rollers M2 GP 10. Secure them with nuts 138 70 1 which should be thoroughly screwed home;

— the right hand lower roller M2 GP 9 with two nuts 138 70 1. As a temporary measure for axial position, make sure that only a single thread of the shank of M2 GP 9 juts out from the inside nut. Keep the eccentricity turned downwards. Screw up the nuts, but not tightly;

— the shanks of the upper lateral roller P4 P 6. Secure them with two nuts 138 50 6 which should be screwed on, but not tightly. Keep their eccentricity turned upwards. Place roller M2 P 17 on each of the two shanks, securing it with the spring clip 45 22 1;

— upper central ball bearing P4 EP 5. Secure it with nut 138 50 6.

Keep its eccentricity turned upwards.

b) Place the check carriage plate P4 P 12 in position on the front central part of the fixed guide. Secure it with a screw P4 P 13 which should only be partially screwed in. Place washer 40 36 14 between the head of the screw and the plate.

c) Place ball bearing M2 P 16 in position over the hole in the small plate P4 P 12. Next place washer P4 P 20 and secure the bearing with special screw 125 40 3 which should only be partially screwed in.

d) Fit screw 125 30 10, placing washer 40 36 14 under its head, on the front part of the fixed guide.

P4 P 6	Upper lateral shank
P4 P 12	Check carriage plate
P4 P 13	Special screw for P4 P 12
P4 P 20	Washer for upper bearing
P4 EP 5	Complete upper central roller
M2 P 16	Ball bearing
M2 P 17	Upper lateral roller
M2 GP 9	Lower right hand roller complete
M2 GP 10	Lower left hand and central roller complete
125 30 10	Special screw for P4 P 12
125 40 3	Special screw for M2 P 16
138 50 6	Hexagonal nut for P4 P 6 - P4 EP 5
138 70 1	Hexagonal nut for M2 GP 9 - M2 GP 10
40 36 14	Washer for 125 30 10
45 22 1	Spring clip for M2 P 17

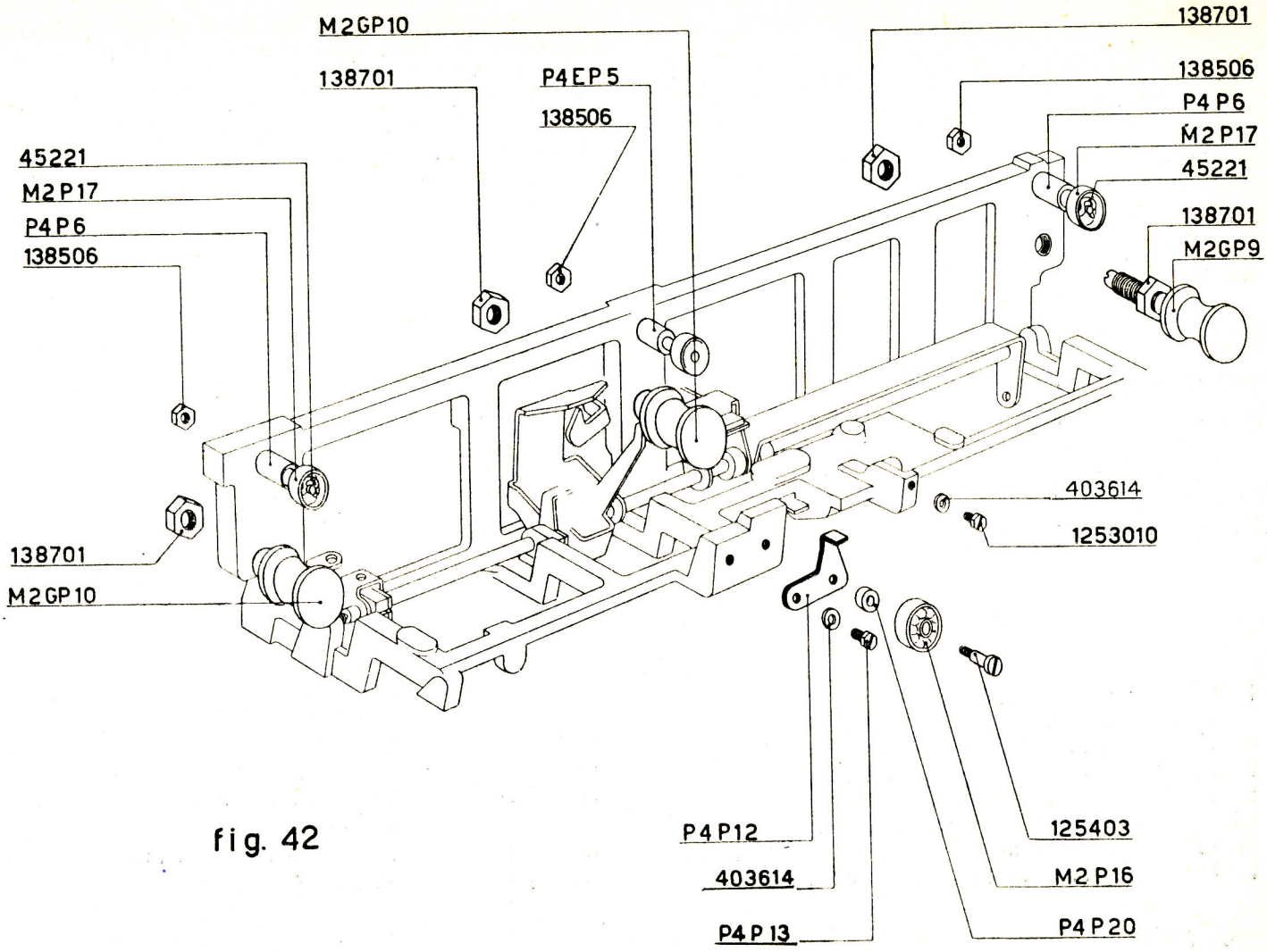

M2GP10
138701
P4EP5
138506
45221
M2P17
P4P6
138506
138701
M2GP10
138701
138506
P4P6
M2P17
45221
138701
M2GP9
403614
1253010
P4P12
403614
P4P13
125403
M2P16
P4P20

fig. 42

41 - FIGURE 43

a) Screw the fixed tooth position regulator P4 I 14 on to the fixed guide. Secure it with nut 138 30 5 which should be screwed on, but not tightly.

b) On the escapement rocker plate P4 EI 10:

— screwing the regulator P3 I 12 with its nut 138 30 5;

— fit movable tooth P4 I 11;

— hook spring P4 I 19 between the frame of the P4 EI 10 and the P4 I 11.

c) Assemble on the pin of the escapement wheel P4 I 3, the following parts in the order given:

— escapement wheel P4 GI 6;

— friction washer P3 I 18;

— silencer finger P3 I 7;

— spring for silencer finger P4 I 8;

— washer 40 36 6.

Screw the pin P4 I 3 on the fixed guide. Check that the smallest diameter spiral of the spring P3 I 8 fits round the washer 40 36 6.

The bent arm **A** of the silencer finger should fit in hole **F** of the fixed guide.

Lock pin P4 I 3; on its threaded shank screw on nut 138 35 1 which should also be well tightened. Check the perfectly free rotation of the escapement wheel; bear in mind that its movement is slightly checked by spring P4 I 8.

d) Screw conical pivot screw 129 30 2, with its nut 138 30 5, on to the fixed guide. Suspend the previously assembled escapement unit between this pivot screw and the one already fixed on the guide.

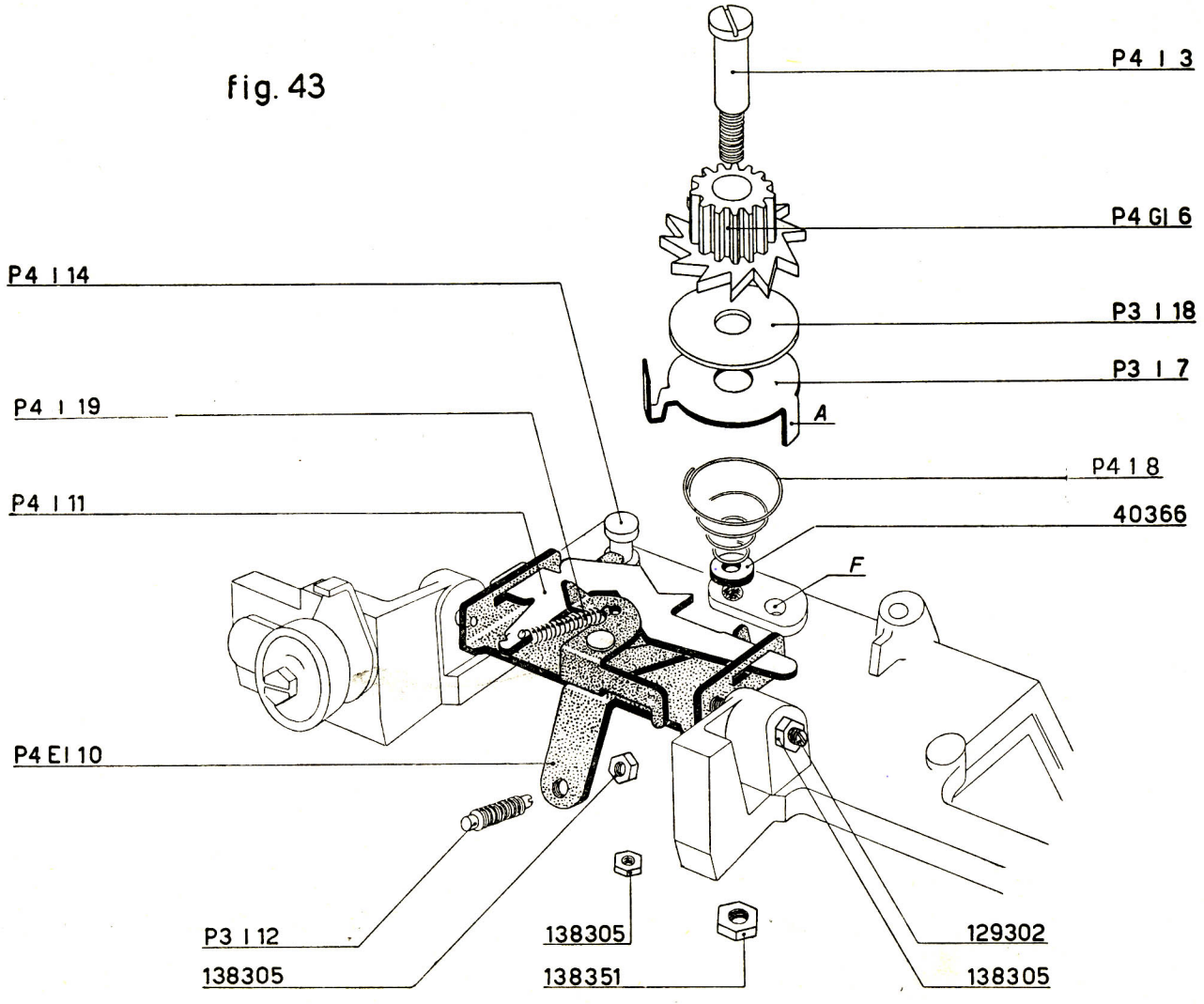
The rear spur of the fixed tooth P4 EI 10 should be inserted in the collar of the regulator P4 I 14.

Adjusting the conical pivot screw 129 30 2 as required. eliminate completely any axial play of the fixed tooth P4 EI 10. It must, however, rotate freely. When this condition is reached, lock the nut 138 30 5 of pivot screw 129 30 2.

P4 I 3	Escapement wheel pin
P4 I 8	Spring for silencer finger
P4 I 11	Movable tooth of escapement
P4 I 14	Fixed tooth position regulator
P4 I 19	Spring for P4 I 11
* P4 GI 6	Escapement wheel and cogwheel
P4 EI 10	Escapement rocker plate with frame
P3 I 7	Movable tooth silencer finger
P3 I 12	Trip regulator V. T.
P3 I 18	Friction washer for silencer finger
129 30 2	Conical pivot screw for P4 EI 10
138 30 5	Hexagonal nut for 129 30 2 - P3 I 12 - P4 I 14
138 35 1	Hexagonal nut for P4 I 3
40 36 6	Washer for P4 I 3

* Specify spacing.

fig. 43


P4 I 3
P4 GI 6
P4 I 14
P3 I 18
P3 I 7
P4 I 19
A
P4 I 8
P4 I 11
40366
F
P4 EI 10
P3 I 12
138305
138305
138351
129302
138305

42 - FIGURE 44

Hook spring P4 I 18 between the special bent extension of the fixed tooth and the slot in the special nipple on the fixed guide.

43 - FIGURE 45

For clarity, figure 45 only shows fixed tooth P4 EI 10.

a) Adjust the height of the regulator P4 I 14 so that there is a clearance of 0,2 mm. (0.008 of an inch.) between tooth **D** and the teeth of the escapement wheel.

N. B. The path of the fixed tooth is also determined by regulator P4 I 14.

44 - FIGURE 46

Again for clarity, figure 46 only shows the movable tooth.

a) Rotate the escapement wheel anti-clockwise. The shank **B** of the silencer finger helped by the first tooth of the escapement wheel, should move the movable tooth away.

b) As rotation is continued, the successive teeth of the escapement wheel should pass the small tooth **H** of the movable tooth with a minimum safe clearance **L**.

N. B. The movable tooth should move away from the teeth of the escapement wheel smoothly. The bent portion of shank **B** should be more or less parallel to the inclined surface on which the movable tooth makes contact. If necessary, adjust the inclination, using moderate force.

c) If the escapement wheel is rotated clockwise, the movable tooth should return to rest, i. e. it should mesh with the teeth of the wheel itself.

P4 I 14	Fixed tooth position regulator
P4 I 18	Spring for P4 EI 10
P4 EI 10	Escapement rocker plate with frame

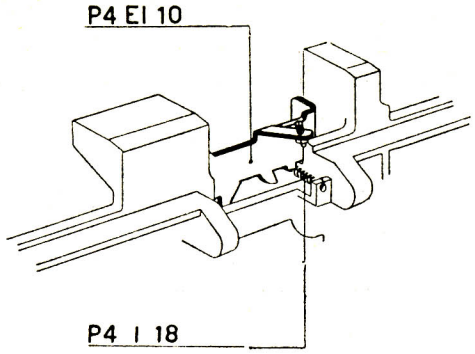


fig.44

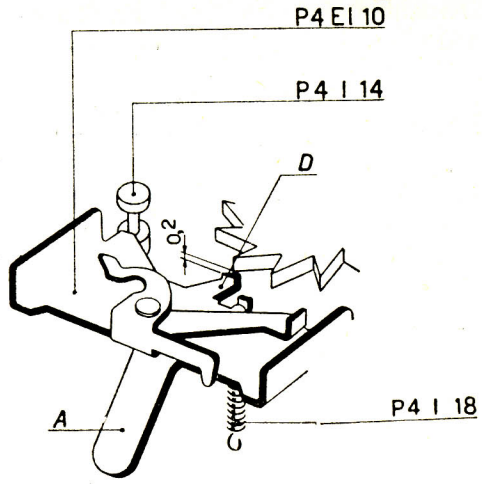


fig. 45

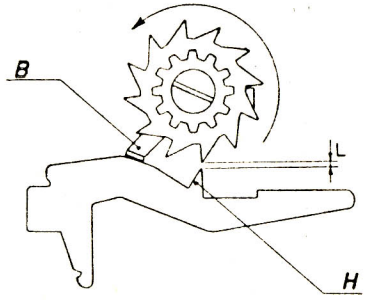


fig. 46

45 - FIGURE 47

a) Assemble the right hand bracket for the release shaft P4 Q 40 on the upper face of the fixed guide. Secure it with two screws 120 30 3.

Screw the M2 Q 35 head less support screw with its nut 138 40 5 on to the bracket. Leave nut untightened.

b) Mount the bell striker P4 Q 22 on bracket P4 Q 40. Secure it with stud 126 30 33 and nut 138 30 5. Hook spring 63 25 5 between P4 Q 40 and P4 Q 22.

c) Place the bell M2 Q 43 in position on the rear part of the fixed guide with a washer 40 36 6 between the former and the guide. Secure with a screw 120 35 2.

P4 B 24/1	First movement link
P4 I 11	Movable tooth of escapement
* P4 GI 6	Escapement wheel and cogwheel
P4 N 8	Special stud
P4 EN 6	Back space pawl with frame
P4 Q 22	Bell striker
P4 Q 40	Right hand release shaft bracket
P4 V 14	Lever disengaging movable tooth
P4 EV 12	Tabulator frame with bracket
M2 N 9	Large headed collet screw for back space

* Specify spacing.

46 - FIGURE 48

a) Assemble the frame with the back space control pawl P4 EN 6 on the right of the fixed guide securing it with special stud P4 N 8. Secure the pawl of P4 EN 6 with a stud M2 N 9.

Hook spring 61 30 8 between the frame and the pawl. Check for complete freedom of movement.

b) Hook pull rod P4 B 24/1 to the tabulator frame P4 EV 12. The free eye of the former hooks on the disengaging lever of the movable tooth P4 V 14. Place the latter on the corresponding nipple of the fixed guide and secure it with a stud 126 30 33. The bent end lever P4 V 14 should be placed in front of movable tooth P4 I 11.

M2 Q 35	Headless support screw for release shaft
M2 Q 43	Bell
120 30 3	Cheese head screw for P4 Q 40
120 35 2	Cheese head screw for M2 Q 43
126 30 33	Cheese head pivot stud screw for P4 Q 22 - P4 V 14
138 30 5	Nut for 126 30 33
138 40 5	Hexagonal nut for M2 Q 35
40 36 6	Washer for M2 Q 43
61 30 8	Spring for P4 EN 6
63 25 5	Spring for P4 Q 22

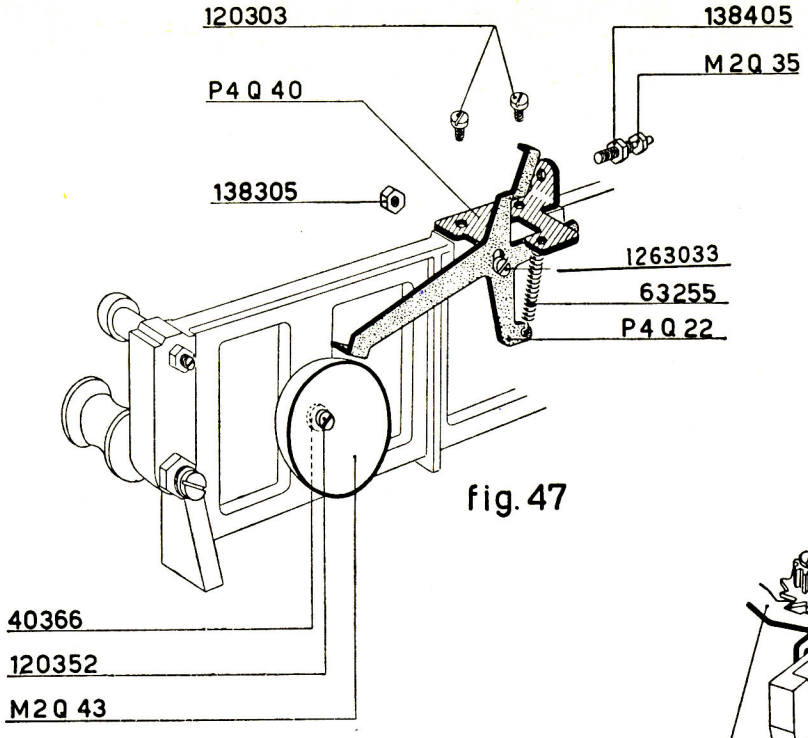

120303
138405
M2Q35
P4Q40
138305
1263033
63255
P4Q22
40366
120352
M2Q43

fig. 47

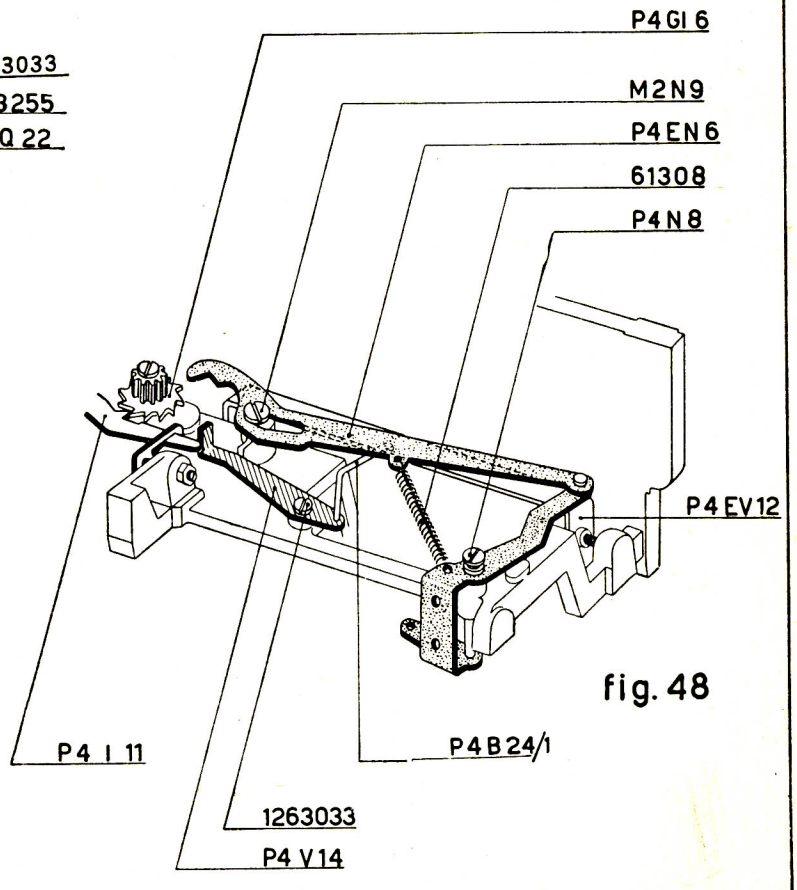

P4GI6
M2N9
P4EN6
61308
P4N8
P4EV12
P4I11
P4B24/1
1263033
P4V14

fig. 48

47 - FIGURE 49

a) Assemble the keyboard locking control lever and frame P4 EQ 8 under the fixed guide with a stud 126 30 33. The small shaft is inserted in the two guide holes made in the two special projections. Assemble the frame blocking eccentric P4 Q 12 on this small shaft with its screw 124 30 7. Temporarily adjust the axial position of the eccentric, so that its small shaft cannot slip out of the guide holes.

b) Place the vertical locking control lever P4 Q 9 on the rear part of the fixed guide, securing it with stud 126 30 33.

c) Hook springs 62 30 11 between P4 EQ 8 and P4 Q 9.

P4 O 1	Pin for main spring drum
P4 O 4	Carriage spring
P4 Q 9	Vertical keyboard locking control lever
P4 Q 12	Frame locking eccentric
P4 EQ 8	Keyboard locking lever with frame locking shaft

48 - FIGURE 50

Assembly of the main spring drum P4 CO 1.

a) Place spring P4 O 4 in the main spring drum P3 O 2. The external slot **H** of the spring fits over hook **G** on the wall of the drum.

b) Introduce pin P4 O 1. The bent tab **P** at internal end of spring P4 O 4 should fit inside the notch.

c) Arrange the cover P3 O 3 on the drum P3 O 2 so that its projecting tab **A** corresponds with slot **F** and the projection **K** are stopped by the dents **R**.

Bend tab **A** outwards and insert it in slot **F**.

P3 O 2	Main spring drum
P3 O 3	Main spring drum cover
124 30 7	Grub screw for P4 Q 12
126 30 33	Cheese head pivot stud screw for P4 Q 9 - P4 EQ 8
62 30 11	Spring for P4 Q 9

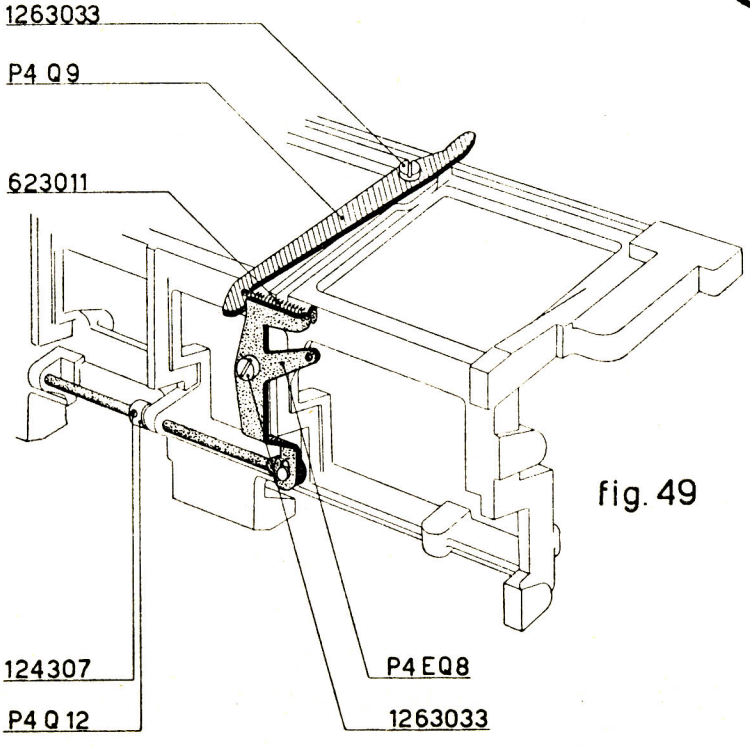

1263033
P4 Q 9
623011
124307
P4 Q 12
P4 E Q 8
1263033

fig. 49

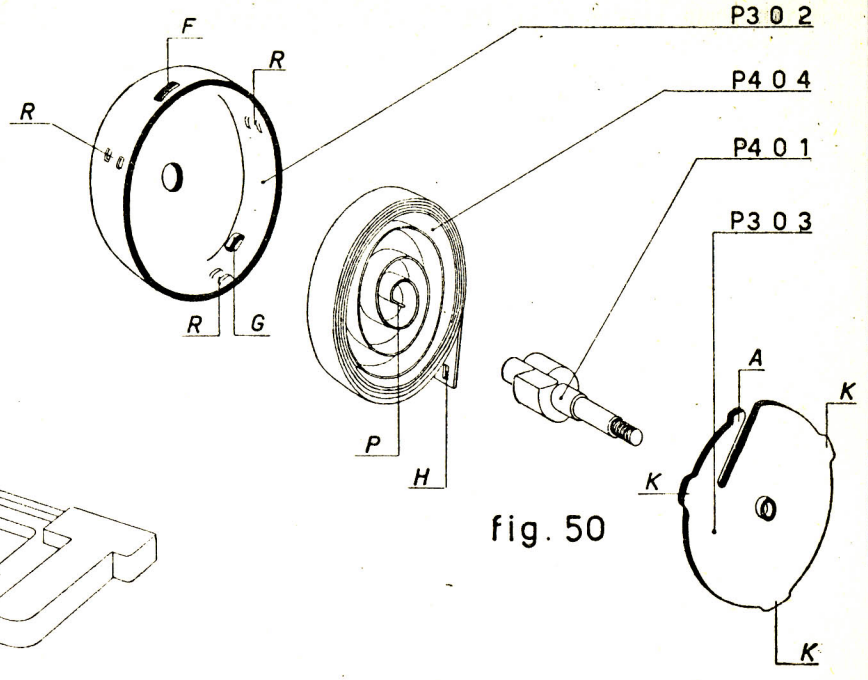

F
R
R
R
G
P
H
P3 0 2
P4 0 4
P4 0 1
P3 0 3
A
K
K
K

fig. 50

49 - FIGURE 51

Fit the main spring drum P4 CO 1, ready assembled, on the left of the fixed guide. Secure it with nut 138 30 5 which should be thoroughly tightened.

P4 O 5	Carriage draw wire	138 30 5	Hexagonal nut for P4 CO 1
P4 CO 1	Main spring drum complete		

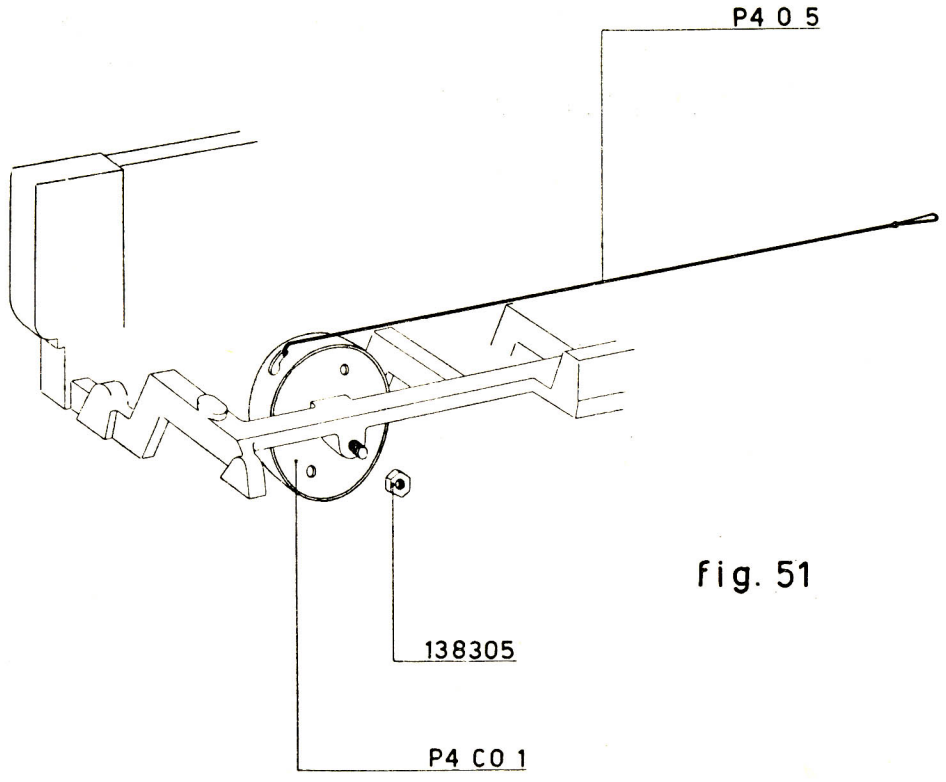


Fig. 51

50 - FIGURES 52 and 52a

a) Screw the support screw P4 R 15 with its nut 138 30 5 on to the right side of the movable guide P4 CR 1.

b) Assemble a pair of levers P4 R 7 on each small side of the movable guide, securing them with studs 126 30 42. Take care to place the lever of the front roller against the small side of the movable guide.

c) Place the shaft P4 GR 16 with lever controlling the lower paper feed, between the pivot **P** of the left side and the support P4 R 15 already screwed on the right side. The rear arm of the lever should rest on pin **P1**.

Adjust support P4 R 15 as required to reduce the axial play of shaft P4 GR 16 to a minimum compatible with perfect freedom of rotation. When this condition is obtained, lock the nut 138 30 5 of support P4 R 15.

d) Hook a spring P4 R 5 between each pair of levers P4 R 7 (figure 52a).

P4 R 5	Spring for paper feed shaft
P4 R 7	Lower paper feed roller
P4 R 15	Right hand support for lower paper feed control frame
P4 CR 1	Side members of carriage with rail and tabulator tube
P4 GR 16	Lower paper feed control
138 30 5	Hexagonal nut for P4 R 15

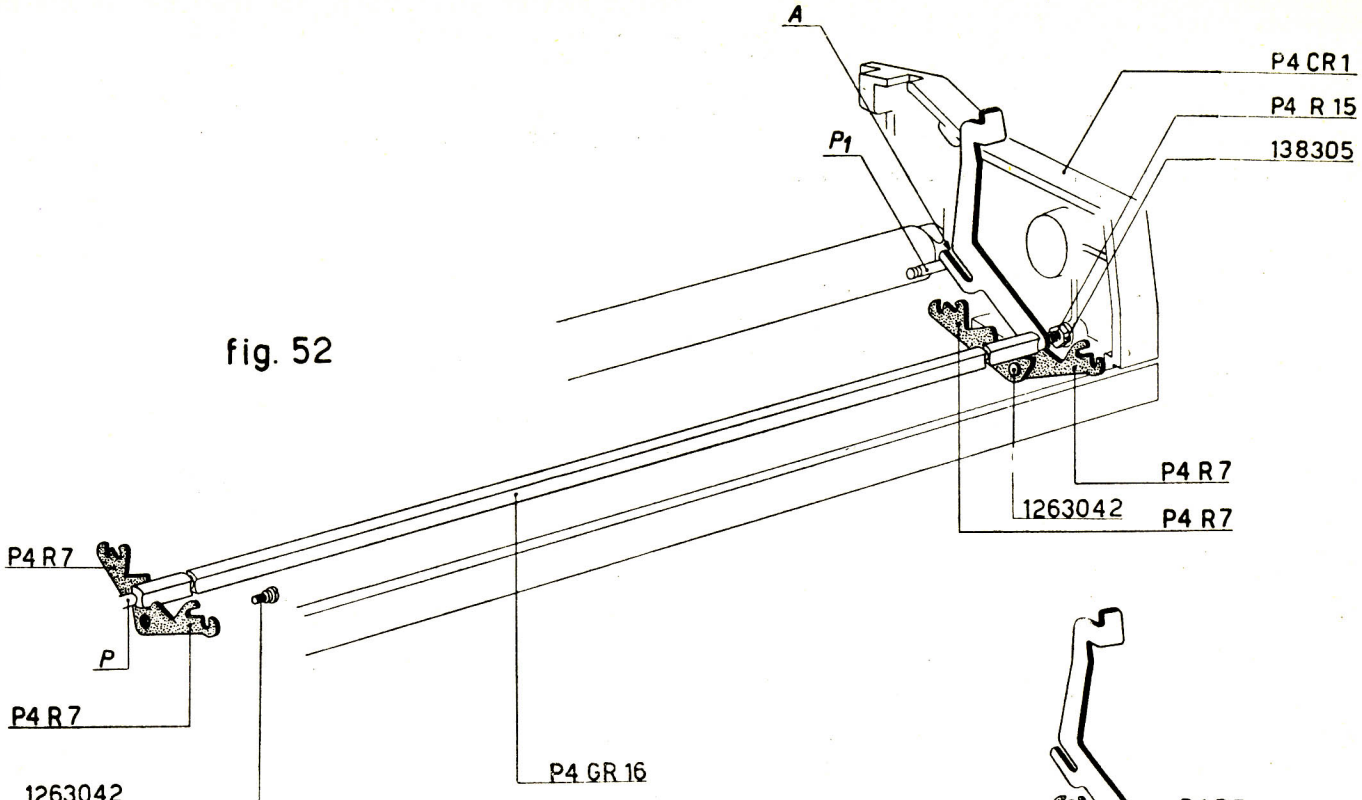


fig. 52

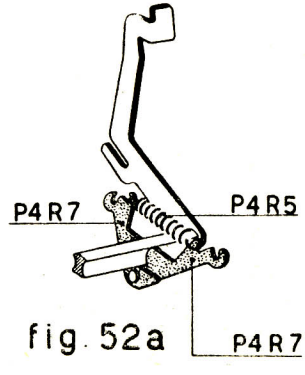


fig. 52a

51 - FIGURES 53 and 53a

a) Assemble a small spring M2 R 63 in each of the two bail rollers M2 DR 64. Place the rollers ready assembled on the bail rod P4 R 28. Mount the corresponding left and right hand arms P4 GR 30-S and P4 GR 30-D on the two extremities of the rod with special screw M2 R 66.

b) Assemble the left and right hand carriage release levers P4 S 3 and P4 S 4 on the guide pin **P** of the side of the movable guide. Slip over the same pin the rear slot of the two arms P4 GR 30-S and P4 GR 30-D.

c) Hook springs 63 50 3 between the spring holder of the arms P4 GR 30-S and P4 GR 30-D and the corresponding spring holder **P1** fixed on the side of the movable guide.

* P4 R 28	Bail rod
P4 GR 30-D	Upper right hand bail rod arm
P4 GR 30-S	Upper left hand bail rod arm
P4 S 3	Left hand carriage release lever
P4 S 4	Right hand carriage release lever
M2 R 63	Spring for bail roller
M2 R 66	Bail bar screw
M2 DR 64	Bail roller
120 30 7	Cheese head screw for P4 R 1
32 26 1	Dowel pin for P4 R 1
63 50 3	Spring for P4 GR 30-S and D

* Specify spacing.

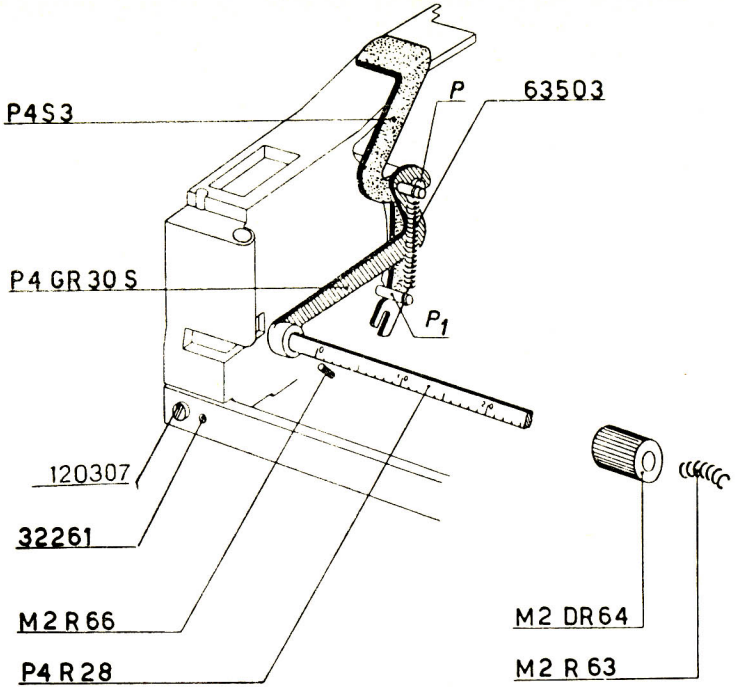


fig. 53

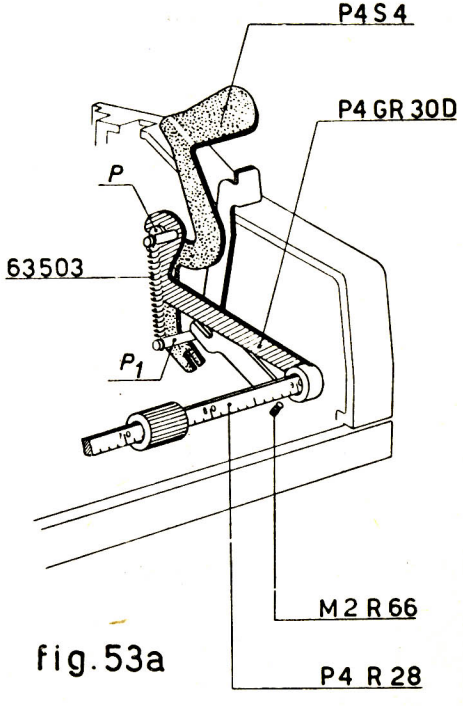


fig. 53a

52 - FIGURES 54 and 55

a) Assemble leaf spring M2 R 33 on the paper guide P4 DR 31 (figure 54).

b) Place the paper guide ready assembled on the paper table P4 DR 24. Check that the former can slide, with slight friction, over the whole length of the plate. If necessary adjust the tension of leaf spring M2 R 33.

c) Hook the small springs 62 30 11 to the two rear holes on the paper table support.

d) Place the paper table support in position on the movable guide. Keep it pressed down and secure it with two screws 120 30 2.

e) Hook springs 62 30 11 to the two carriage release levers P4 S 3 and P4 S 4. Check that lever turns freely.

f) On the two sides of the movable giude screw respectively:

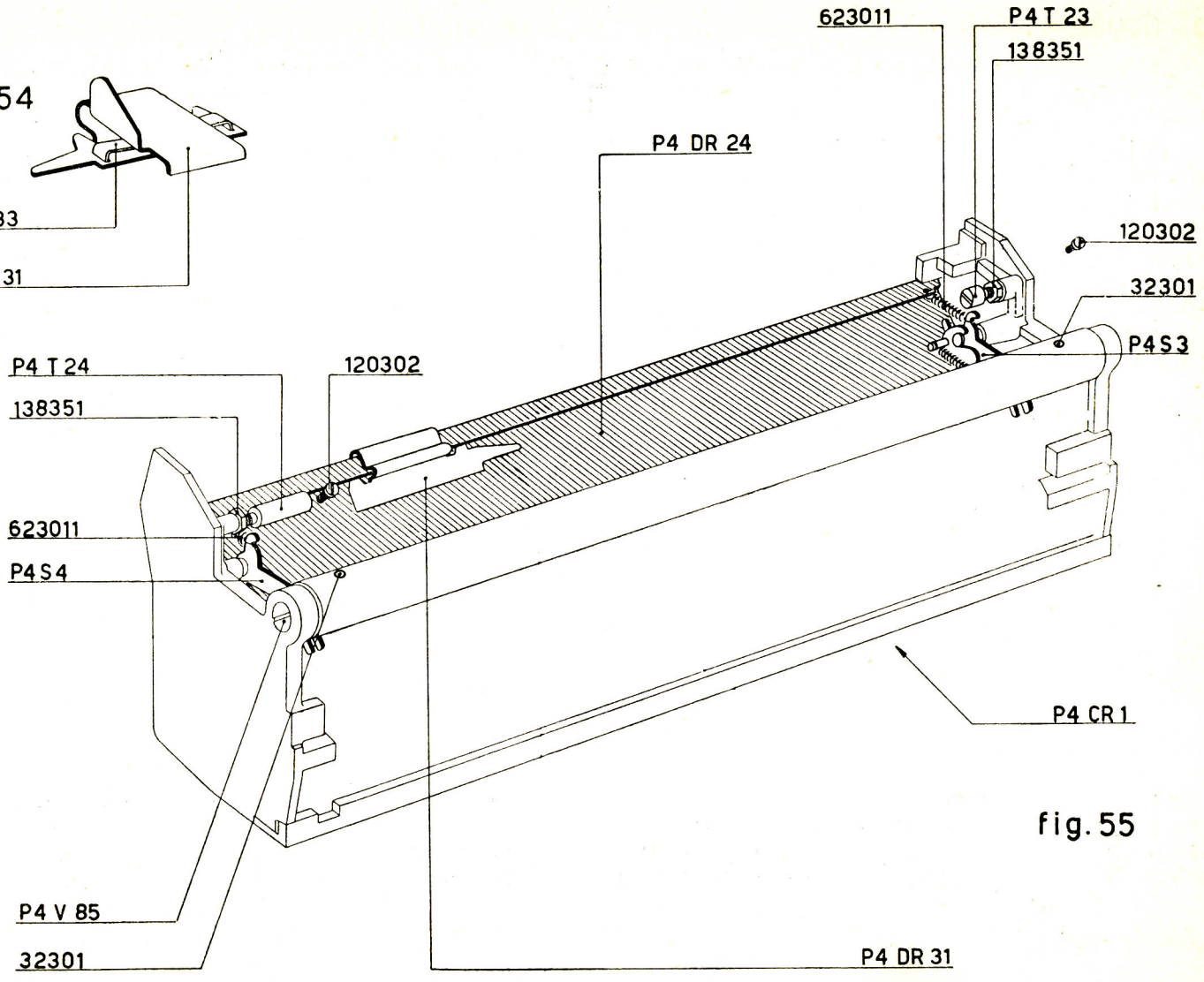
— the left hand carriage safety stop P4 T 23 with nut 138 35 1;

— the right hand carriage safety stop P4 T 24 with nut 138 35 1.

P4 CR 1	Carriage sides with rail and tabulator tube	P4 T 24	Right hand carriage safety stop
P4 DR 24	Paper table support	P4 V 85	Screw for tube
P4 DR 31	Paper guide with friction member	M2 R 33	Leaf spring for paper guide
P4 S 3	Left hand carriage release lever	120 30 2	Cheese head screw securing P4 DR 24
P4 S 4	Right hand carriage release lever	32 30 1	Dowel pin for P4 V 80
P4 T 23	Left hand carriage safety stop	138 35 1	Hexagonal nut for P4 T 23 - P4 T 24
		62 30 11	Spring for P4 S 3 - P4 S 4

fig. 54

M2 R 33
P4 DR 31



623011
P4 T 23
138351
P4 DR 24
120302
32301
P4 S 3
P4 T 24
138351
120302
623011
P4 S 4
P4 CR 1
P4 V 85
32301
P4 DR 31

fig. 55

53 - FIGURE 56

a) Assemble the carriage release bracket P4 GS 5 on the rack P4 I 5. Secure with two screws 120 30 14 which should be left slack.

b) Insert the pin of the bracket in the hole in the left arm of the carriage release control bracket P4 GS 8.

c) Insert the pin of a second carriage release bracket P4 GS 5 in the hole of the right hand arm of control bracket P4 GS 8. Secure the bracket to the rack with two screws 120 30 14 which should not be screwed in tightly.

d) The tolerance for the axial play of bracket P4 GS 8 is 0,5 to 0,6 mm. (0.02 of an inch.).

54 - FIGURE 57

a) Arrange the unit now assembled (rack and bracket) on the movable guide so that:

— the rack rests on the corresponding projections;

— the pin **P** of the lateral arms of the bracket enter into the end slots of the two carriage release levers P4 S 3 and P4 S 4.

Attach the rack with a screw 120 35 2 on the left and a special screw P4 I 13 on the right. The screws should be screwed home but not tightly.

b) Check that the bracket controlling the two levers P4 S 3 and P4 S 4 works freely. If necessary, adjust the level of the levers and the lateral arms of the bracket.

* P4 I 5		Rack
P4 I 13		Special clamp screw for rack
P4 S 3		Carriage release lever - left hand
P4 S 4		Carriage release lever - right hand
P4 GS 5		Bracket for carriage release control
P4 GS 8		Carriage release control
120 30 14		Clamp screw for P4 GS 5
120 35 2		Clamp screw for P4 I 5

* Specify spacing.

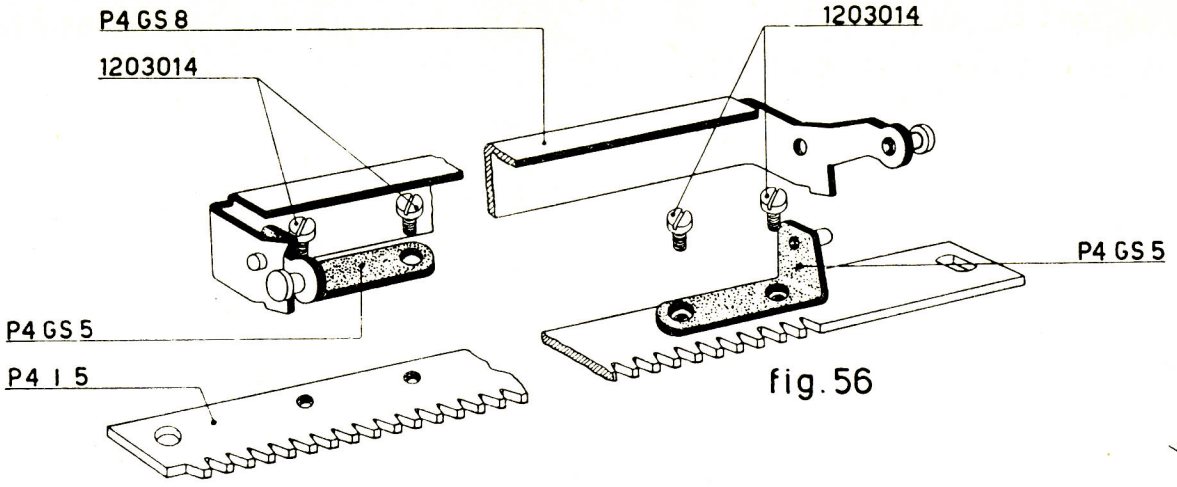

P4 GS 8
1203014
1203014
P4 GS 5
P4 GS 5
P4 I 5

fig. 56

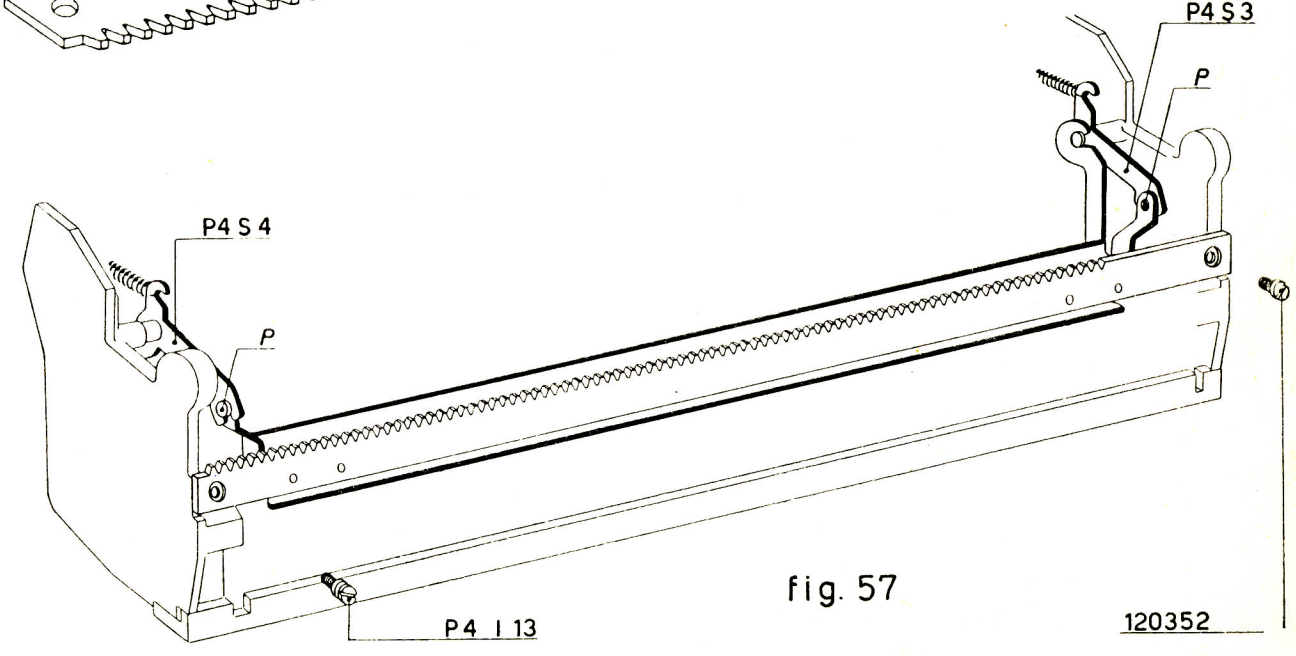

P4 S 3
P
P4 S 4
P
P4 I 13
120352

fig. 57

55 - FIGURES 58 - 59 - 60 - 60a and 61

The coupling of the movable guide to the fixed guide.

N. B. The tube on rail of the movable guide is guided by three grooved rollers below and by two rollers and a ball bearing above (figure 58).

— the left hand and centre grooved rollers **R** are fixed.

— the right hand grooved roller **Rr** is adjustable in height and side position.

— the upper rollers **R1** and the ball bearing **C** are adjustable in height.

a) Stop the movable tooth on the escapement wheel by inserting a 2 mm. (5/64") feeler in the right hand slot of the movable tooth guide.

b) Place the movable guide on the fixed guide. The rail tube should be lodged between the upper and lower rollers.

The front rail **R** (figure 61) must be inserted between the ball bearing M2 P 16 and the upper shank **A** of the carriage check plate P4 P 12.

c) Place the movable guide in the position indicated in figure 59. The rail tube **T** rests on the two fixed rollers **R**.

d) Adjust the height of the ball bearing **C** (figure 59). It should be brought in contact with tube **T**. Check that:

— when the bearing is rotated, it sets the movable guide in motion;

— using moderate pressure with one or two fingers on the bearing and making the movable guide slide, the bearing itself rotates.

e) Adjust the height of the upper left hand roller **R1** (figure 59). Lower it until it just barely touches the rail tube. When it is rotated, observe that it creates a certain amount of friction on the tube **T** without completely succeeding in setting the movable guide in motion.

f) Centre the movable guide in relation to the fixed guide. Adjust the right roller **Rr** for side position and height. It is then secured by two nuts **D** and **D1** (figure 60).

— to adjust the height, its threaded leg **V** must be turned.

— to adjust for side position, the leg **V** must be held steady while the nuts **D** and **D1** are screwed or unscrewed.

The roller **Rr** must be centred in relation to tube **T** (figure 60a) and must exert the same pressure on it as exerted by the grooved roller at the left.

g) Adjust the right hand upper roller in height. Proceed as explained in *d)* for the upper left hand roller.

h) Adjust the position of the carriage check plate P4 P 12 in height (figure 61).

Place a feeler of 0,1 mm. (0.004 of an inch.) thickness between the ball bearing and the lower face of the front guide rail **R**. Bring shank **A** of the carriage check plate P4 P 12 into contact with the upper side of the rail **R**. Lock the screws securing the bearing and plate.

i) Slide the movable guide and check that its movement is completely free and without noise. Check again, if necessary, the adjustments of the coupling.

l) Check that the nuts of the upper and lower rollers are thoroughly locked.

m) Release the movable tooth by removing the 2 mm. (5/64") feeler.

P4 P 12 Carriage check plate

M2 P 16 Ball bearing

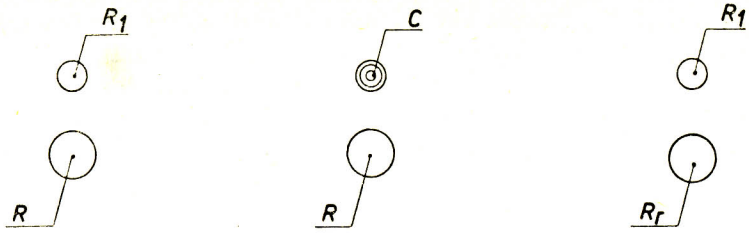


fig. 58

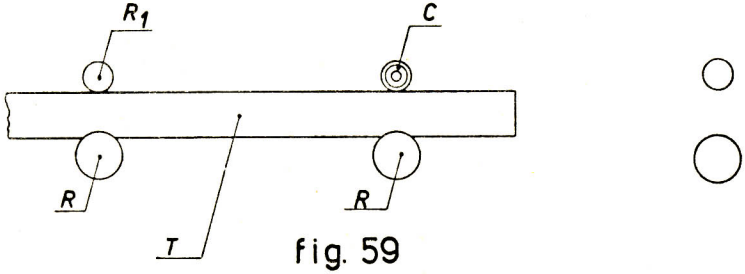


fig. 59

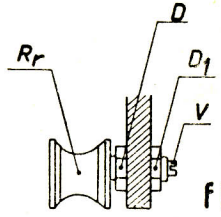


fig. 60

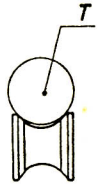


fig. 60a

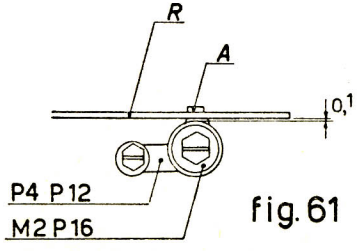


fig. 61

56 - FIGURE 62

Adjust the position of the rack in relation to the escapement wheel. The clearance indicated in the figure should be seen along the whole length of the rack.

This clearance is obtained by adjusting the depth of the rack. When this condition is reached, lock screw 120 35 2 and the special screw P4 I 13 which hold the rack to the movable guide (figure 57). Check that the movable guide slides freely; there should be no fouling between the rack and wheel.

57 - FIGURE 63

Adjust the position of the carriage release control in relation to the rack. Lowering one of the two carriage release levers P4 S 3 and P4 S 4, the control P4 GS 8 moves stank **A** of the carriage release frame backwards. The rear bent part **B** of the same frame carries movable tooth P4 I 11 forwards, thus disengaging it from the escapement wheel.

The path of the movable tooth must satisfy two conditions:

— it must be sufficient to cause the release of the carriage;

— it must not be excessive, e. g. such as to make the right hand portion of the movable tooth (shaded part) touch the projection **P** of the fixed guide. The movabel tooth should have a small safety clearance **L**.

These two conditions, which are obtained by moving the two brackets P4 GS 5 in relation to the rack, should be verified:

— with the carriage all the way over to the left: using the left hand carriage release lever P4 S 3;

— with the carriage all the way over to the right, using the right hand carriage release lever P4 S 4.

58 - Remove the movable guide from the fixed guide.

Wind the carriage main spring drum four or five turns. Hook the end of the carriage draw wire P4 O 5 in the opening in the rim of the spring drum (figure 51). The other end of the wire is hooked to stud P4 N 8 which holds the frame carrying the back space control pawl P4 EN 6 (figure 48).

Assemble the movable guide again on the fixed guide.

Unhook the end of the carriage draw wire from stud P4 N 8 and hook it to the special screw P4 I 13 which holds the rack to the movable guide on the right (figure 57).

* P4 I 5	Rack
P4 I 11	Movable tooth of escapement
P4 S 3	Left hand carriage release lever
P4 GS 5	Bracket for carriage release control
P4 GS 8	Carriage release control
120 30 14	Cheese head screw for P4 GS 5

* Specify spacing.

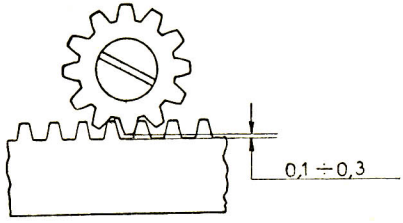


fig. 62

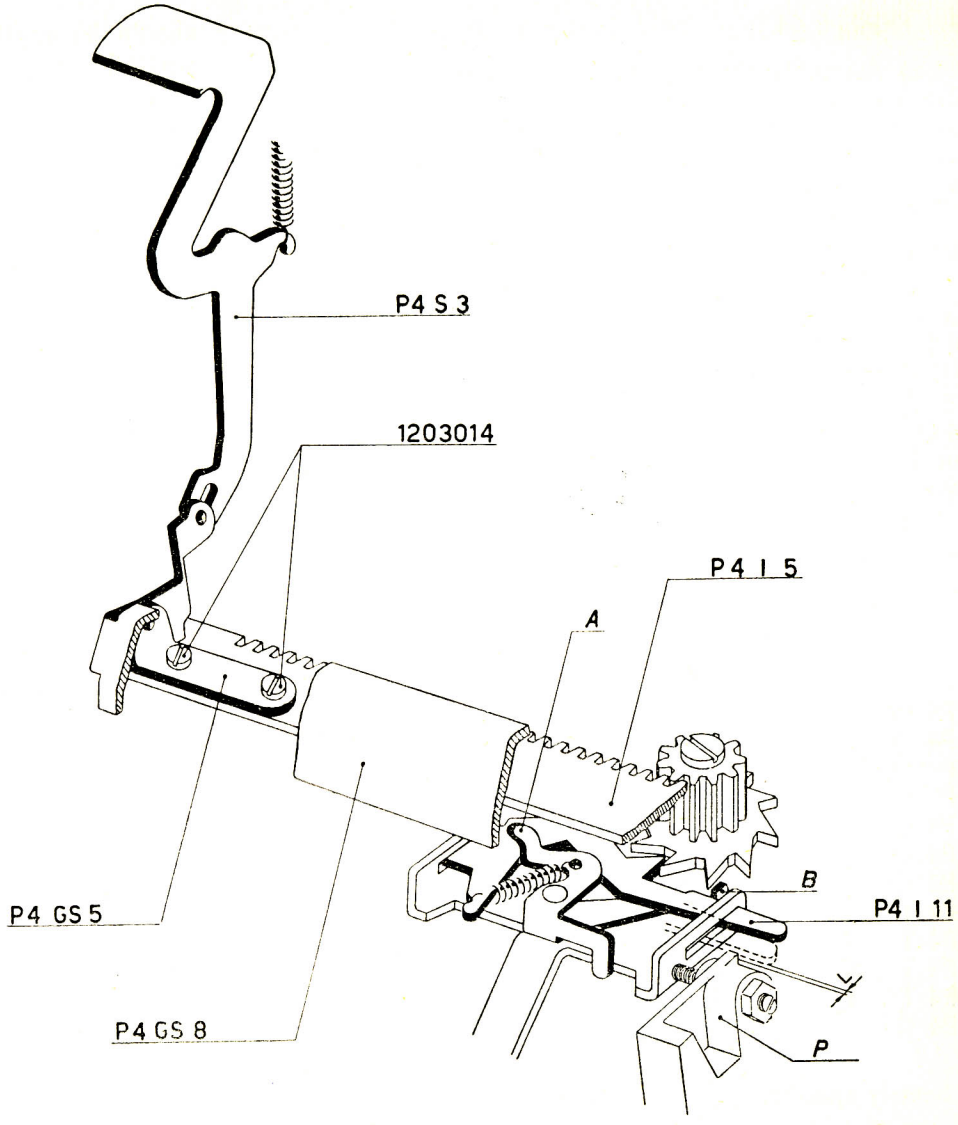


fig. 63

59 - FIGURE 64

a) Assemble the spring P4 Q 47 and collar 142 51 8. with its screw 120 30 14 on the release rod P4 GQ 30. Arranget the horizontal spring head in the transverse slot of the collar. Bend the end of the spring head so as to anchor it to the collar.

b) Screw link M2 Q 38 with its nut 138 30 5 on the margin release control stirrup P4 Q 39.

c) Place the end of the release rod in position on the right hand bracket P4 Q 40 which is already assembled. Fit pin **A** in hole of P4 Q 39. The shaft M2 Q 38 is inserted in the opening of margin release bracket P4 Q 2.

d) Secure the release rod on the left with the bracket P4 Q 34 on which is screwed regulator M2 Q 35 with its nut 138 40 5. Secure P4 Q 34 to the fixed guide with two screws 120 30 3.

e) Turn collar 142 51 8 so as to wind spring P4 Q 47 one turn. Secure the collar using its screw 120 30 14 which should be partially screwed in, not locked. Bend the vertical spring head of P4 Q 47 as required to make it parallel to the plane of the bed of the fixed guide.

60 - FIGURES 65 and 65a

a) Assembling the left hand margin block (figure 65):

— fit the small spring P4 T 12 on the pin of the left hand margin set slider P4 GT 2;

— insert slider P4 GT 2 and then the small block P4 T 4 in the margin set stirrup P4 T 6;

— secure them with three screws 125 30 31.

b) Assembling the right hand margin set (figure 65a). The same instructions apply as for the left hand margin block. The margin set stirrup, spring and screws are the same; slider P4 GT 3 and small block P4 T 5 are used.

P4 Q 2	Margin release bracket
P4 Q 9	Vertical keyboard locking control lever
P4 Q 34	Left hand margin release rod bracket
P4 Q 39	Margin release control stirrup
P4 Q 40	Right hand margin release rod bracket
P4 Q 47	Release rod spring
* P4 GQ 30	Margin release rod
* P4 T 4	Left hand margin block
* P4 T 5	Right hand margin block
P4 T 6	Margin set stirrups
P4 T 12	Spring for margin set stirrups
P4 GT 2	Left hand margin set slider
P4 GT 3	Right hand margin set slider
P4 GV 23	Setting and clearing crank
M2 Q 35	Headless support screw for margin release rod
M2 Q 38	Upper vertical margin release link
120 30 3	Cheese head screw for P4 Q 34
120 30 14	Cheese head screw for 142 51 8
125 30 31	Special screw for P4 T 6
138 30 5	Hexagonal nut for M2 Q 38
138 40 5	Hexagonal nut for M2 Q 35
142 51 8	Collar for P4 Q 47

* Specify spacing.

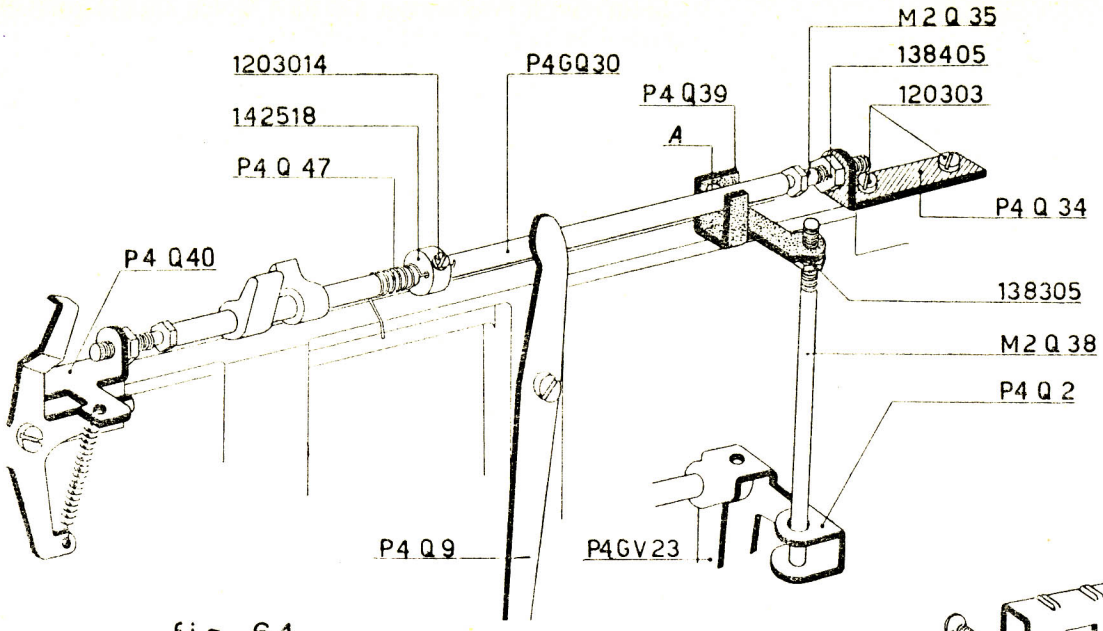


fig. 64

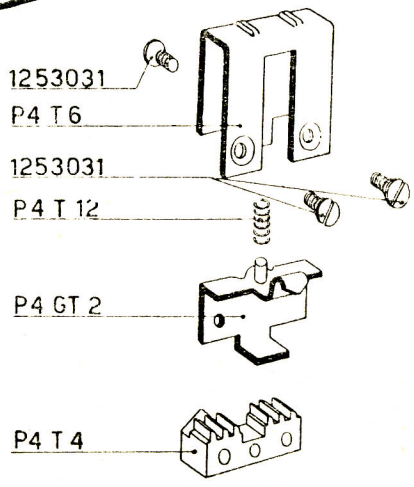


fig. 65

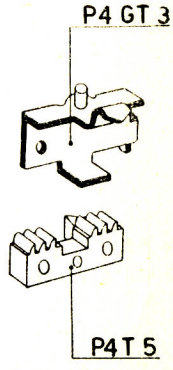


fig. 65a

61 - FIGURES 66 and 66a

a) Place the two margin setters, ready assembled, in position on the rack P4 T 1.

b) Assemble the graduated bracket with paper supports P4 CT 16 on the back of the movable guide. On it fit rack P4 T 1 with its margin setters.

Secure with two screws 120 35 4 which should partially screwed in and not tightened.

c) By adjusting the height of the bracket P4 CT 16 and the rack P4 T 1, regulate the margin setters so that they are at the same distance from the graduated bar (figure 66a).

When this condition is obtained, tighten screws 120 35 4.

* P4 T 1	Margin rack
* P4 CT 16	Graduated bracket with paper supports

* Specify spacing.

120 35 4	Cheese head screw for P4 T 1

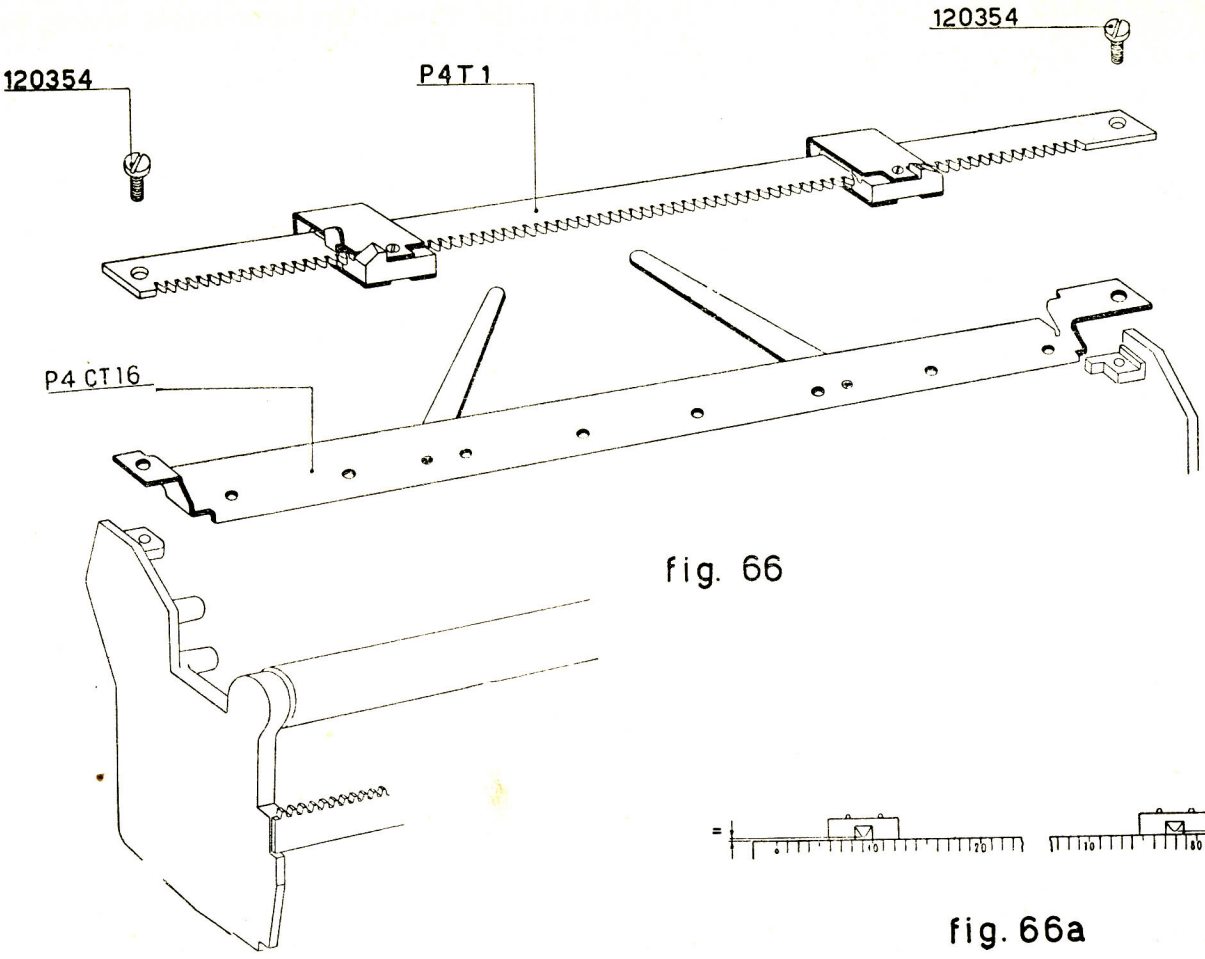


fig. 66

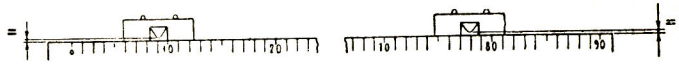


fig. 66a

62 - FIGURES 67 - 68 - 69 and 70

a) In the left side of the movable guide (figure 67):
— screw the stop of pawl P4 U 41 with its nut 138 35 1 which should be partially screwed and not locked;
— fit the spring holder case M2 U 43 and place the spring for line spacer wheel position tooth P4 U 44 in position on it.

b) Place the rubber silencing element P4 U 59 in its seat on the upper face of the left side of the movable guide.

c) Arrange the line spacing cam P4 EU 49 on the collet of the left side. It's button should come out through the special opening above. Mount the graduated sector P4 U 53 securing it with screw P3 U 54. As a temporary setting, arrange it so that the slot of the sector is centered in relation to the screw. The latter should be only partially screwed in. Check that the upper spring of cam P4 EU 49 exerts its pressure so as to make the line space selector lever of P4 EU 49 enter into the corresponding positioning notch.

d) Insert the pin of line space lever bracket P4 GU 61 in its hole. Fit lower crank P4 HU 33 on the pin; position it as shown in figure 67 and secure it with a taper pin 33 16 1.

e) Hook the pull rod P4 U 34 to the crank P4 HU 33 In the direction shown in figure 67.

f) On the corresponding guide pin, fit roller fork P4 U 42 on which will also be set the roller P4 U 45 with its spring clip 45 18 1. Secure the fork with stud M2 U 54.

	P4 U 34	Line space control pull rod
	P4 U 41	Pawl stop
**	P4 U 42	Roller fork
	P4 U 44	Spring for line spacer detent
	P4 U 45	Detent roller
**	P4 U 53	Graduated sector
	P4 U 58	Roller crank return spring
	P4 U 59	Silencing element for spacer lever
	P4 HU 33	Lower spacer crank with hub
	P4 EU 38	Spacer control crank with pawl
	P4 EU 49	Spacer cam
	P4 GU 61	Spacer lever bracket
	P3 U 54	Line spacer sector clamp screw
	M2 U 43	Spring holder case
	M2 U 54	Cheese head screw for P4 U 42
	33 16 1	Taper pin for P4 HU 33
	138 35 1	Hexagonal nut for P4 U 41
	45 18 1	Spring clip for P4 U 45

** Specify line spacing.

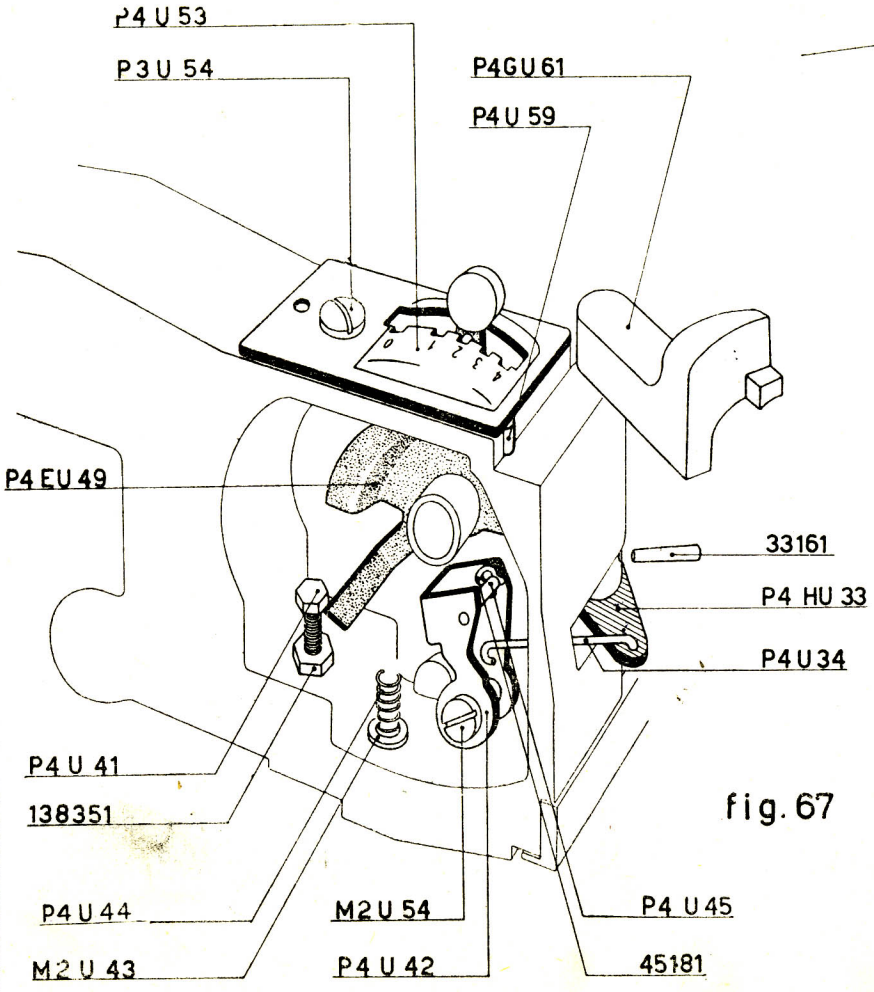

P4 U 53
P3 U 54
P4GU 61
P4 U 59
P4 EU 49
33161
P4 HU 33
P4 U 34
P4 U 41
138351
P4 U 44
M2 U 43
M2 U 54
P4 U 42
P4 U 45
45181

fig. 67

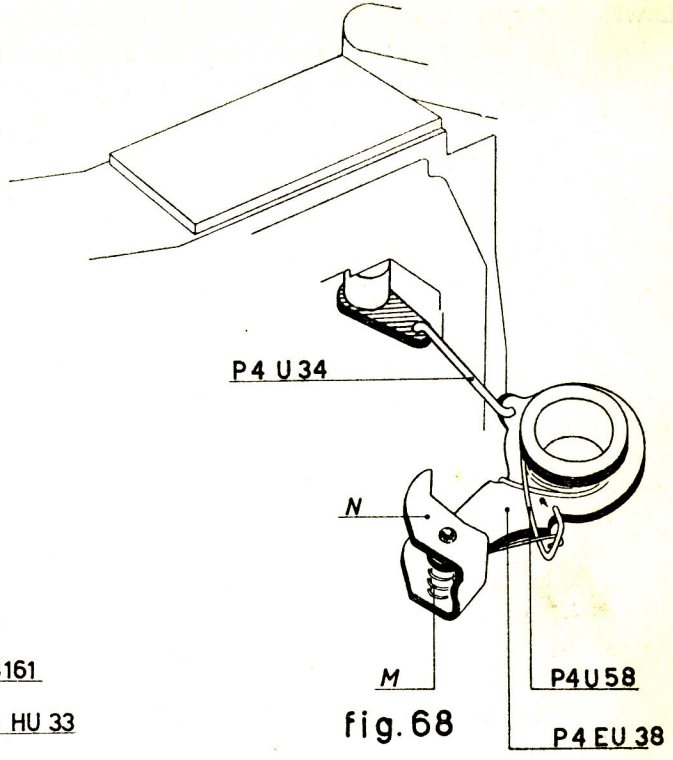

P4 U 34
N
M
P4U58
P4 EU 38

fig. 68

Lower the roller so that it rests on spring P4 U 44.

Bring the line space selector lever to zero position (figure 69); its lower shank will hold down the fork of the detent roller.

g) Fit the return spring P4 U 58 on the pawl carrying crank P4 EU 38 (figure 68). Secure its long end to spring **M** of pawl **N**. This enables the crank P4 EU 38 to be assembled without the aid of special tools.

h) Hook the free eye of pull link P4 U 34 to crank P4 EU 38 (figure 68).

i) Place crank P4 EU 38 in position on the collet of the left side of the movable guide as shown in figure 69.

Using a tool for hooking springs place the end **D** of spring P4 U 58 in the same concavity where the crank P4 HU 33 is housed.

The end **C** of the same spring is placed in the special hole made in the same P4 EU 38.

The extremities **A** and **B** of the spring of pawl **N** are placed as shown in the same figure 69.

l) Place the line spacer lever P4 U 31 in position on the bracket P4 GU 61 with the spring washer P3 U 30 as shown in figure 70. Secure with stud P3 U 62.

	P4 U 31	Line spacing lever
	P4 U 41	Pawl stop
**	P4 U 53	Graduated sector
	P4 U 58	Roller crank return spring
	P4 HU 33	Lower line spacing crank with hub
	P4 EU 38	Line spacer control crank with pawl
	P4 GU 61	Line spacing lever bracket
	P3 U 30	Spring washer for line spacing lever
	P3 U 62	Line spacing lever stud

** Specify line spacing.

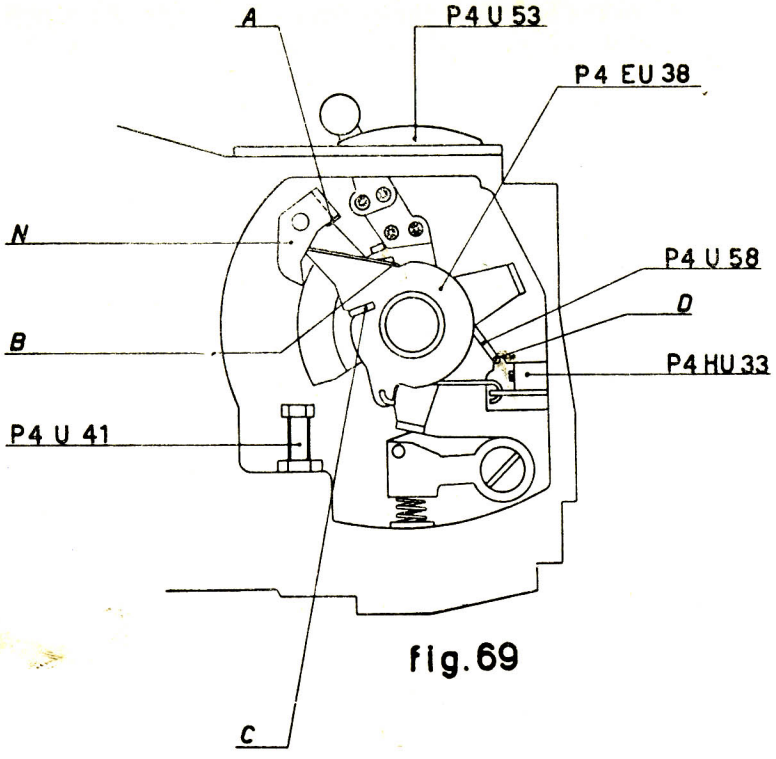

A
P4 U 53
P4 EU 38
N
P4 U 58
D
B
P4 HU 33
P4 U 41
C

fig.69

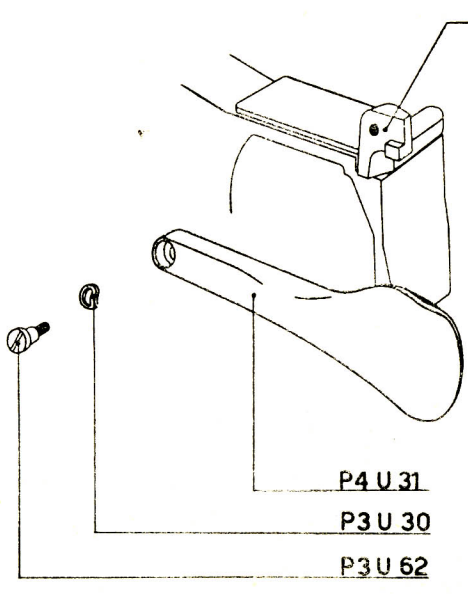

P4 GU 61
P4 U 31
P3 U 30
P3 U 62

fig. 70

63 - FIGURES 71 and 71a

Assembling the clutch unit.

a) Fit the stop disc P4 U 18 on clutch shaft P4 U 5. The hole **A** of the disc should be centered in relation to the slot **F** of P4 U 5. Check that there is absolutely no play between the two parts now coupled.

b) Insert in this order in the opening of the clutch shaft P4 U 5:

— small spring P3 U 25;

— clutch control piston P4 U 24.

c) Secure the details now assembled with pin **32 17 1.** This should be introduced successively:

— in the hole **A** of the stop disc P4 U 18;

— in the slot **F** of the clutch shaft P4 U 5;

— in the hole **B** of the clutch control piston P4 U 24.

Push the pin all the way in so that it does not project from any part of the stop disc P4 U 18.

d) Fit the line spacing wheel P4 U 16 on P4 DU 5. The small teeth of the stop disc should mesh with the inside toothed rim of the line spacing wheel.

e) Screw the platen knob P4 GU 8 in all the way.

f) Screw the clutch control button P4 GU 22 on the threaded pin of the piston. Lock it thoroughly with the special rubber pad UA 8044.

g) When the button P4 GU 22 is pushed inwards, the stop disc P4 U 18 should detach itself from the toothed rim of the line spacing P4 U 16.

P4 U 5	Clutch shaft
** P4 U 16	Line spacing wheel
P4 U 18	Stop disc
P4 U 24	Clutch control piston
P4 DU 5	Clutch shaft with stop dis.

** Specify line spacing.

P4 GU 8	Left hand platen knob
P4 GU 22	Clutch control button with bushing
P3 U 25	Spring for clutch control piston
32 17 1	Dowel pin for P4 U 24

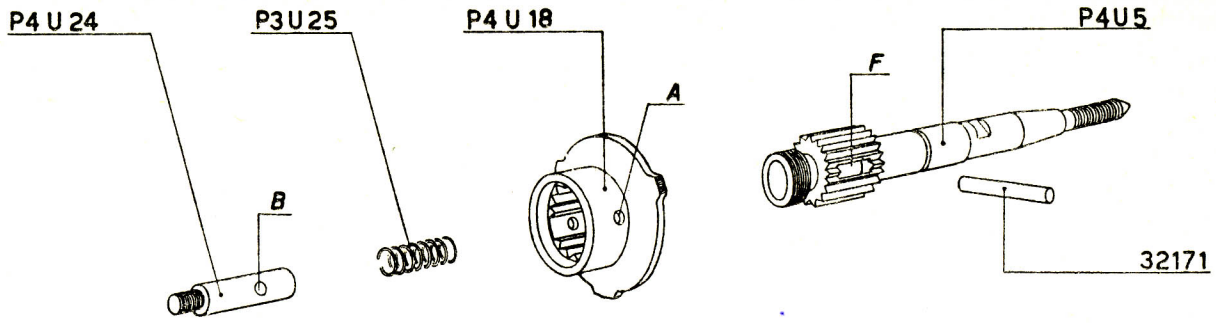


fig. 71

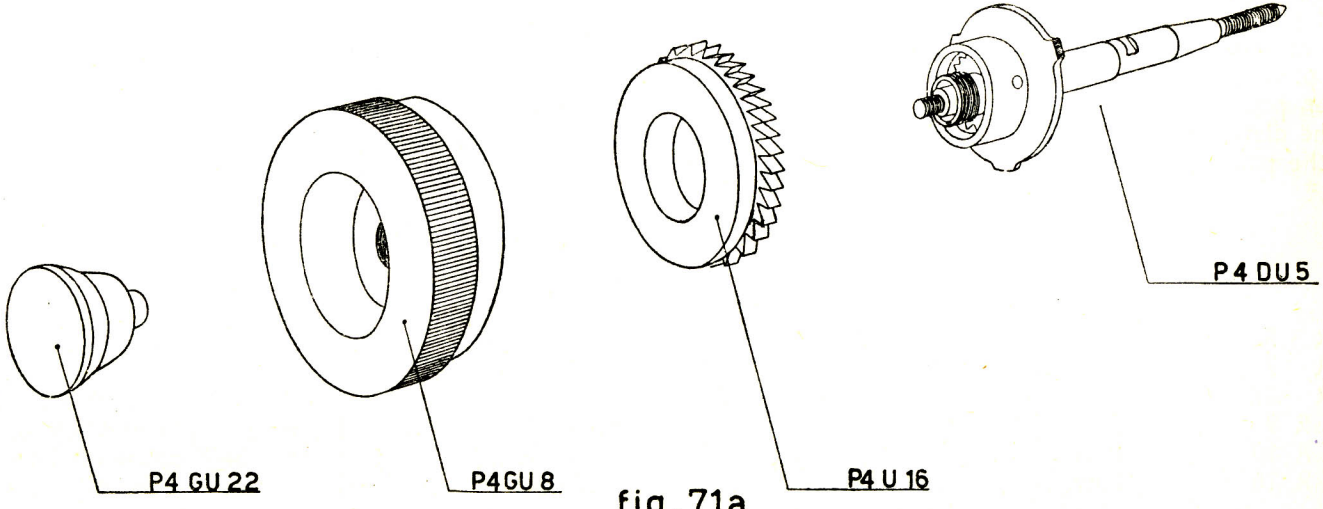


fig. 71a

64 - FIGURE 72

a) On the lower feed levers P4 R 7 assemble:

— the front shaft with rubber feed rollers P4 GR 9;

— the rear shaft with rubber feed rollers P4 GR 10.

b) Fix leaf spring P4 R 37 on the front rail of the fixed guide with screw 120 30 14.

c) Place the paper pan P4 CR 23 in position. The notches of the two lateral shanks should fit into the special grooves in the shaft P4 GR 16.

Check that the paper pan oscillates flexibly on the leaf spring P4 R 37.

d) Screw two nuts 138 90 1 on the shaft of the right hand platen knob P4 GU 9.

e) Ease the platen P4 GU 1 on the pan plate. Screw in fiirmly at each end the left hand platen knob with clutch P4 GU 5 and the right hand knob P4 GU 9.

f) Manipulate the two nuts 138 90 1 so that when the platen completes a full rotation there is absolutely no axial play in at least one point during rotation.

In addition, check the complete freedom of rotation of the platen. During this operation move the upper and lower paper feeds away from it.

The platen, turning in either direction, should not drag on the paper pan P4 CR 23. If required, tighten its two coupling fins and modify by careful bending, the tension of the leaf spring P4 R 37.

g) Check the paper intake between the platen and the lower rollers. Place a paper feeler gauge 0,08 mm. (0.0031 of an inch.) thick between each of the latter and the platen. The feeler should be held firmly.

If the central rollers do not hold the paper, check that the shafts P4 GR 9 and P4 GR 10 are level. If necessary, decrease the tension of springs P4 R 5 which are between each pair of levers P4 R 7. If these springs are too strong, they may arch the two central rollers of the shaft outwards.

h) Check that the paper feed control lever P4 GR 16 makes an idle stroke of 4 ÷ 5 mm. (0.16 ÷ 0.2 of an inch.) before the rollers move away from the platen. The lever rests on pin **P1** of the right side of the movable guide (figure 52). Therefore:

— if the idle stroke is not as prescribed, close slot **A** of the control lever;

— if the idle stroke exceeds the prescribed limits, widen slot **A**.

i) With the lower paper feed open, check that twelve sheets of paper 0.05 mm (0.002 of an inch.) thick pass freely. If they do not, advance slightly the opening of the rollers, lessening the initial idle stroke of the control lever.

P4 R 5	Spring for papes feed shafts
P4 R 7	Lower paper feed levers
P4 R 37	Leaf spring for paper support plate
P4 GR 9	Front paper feed roller complete
P4 GR 10	Rear paper feed roller complete
P4 GR 16	Lower paper feed control

P4 CR 23	Paper pan with cloth
P4 GU 1	Platen with rubber
P4 GU 5	Left hand platen knob with clutch
P4 GU 9	Right hand platen knob with shaft
120 30 14	Cheese head screw for P4 R 37
138 90 1	Hexagonal nut for P4 GU 9

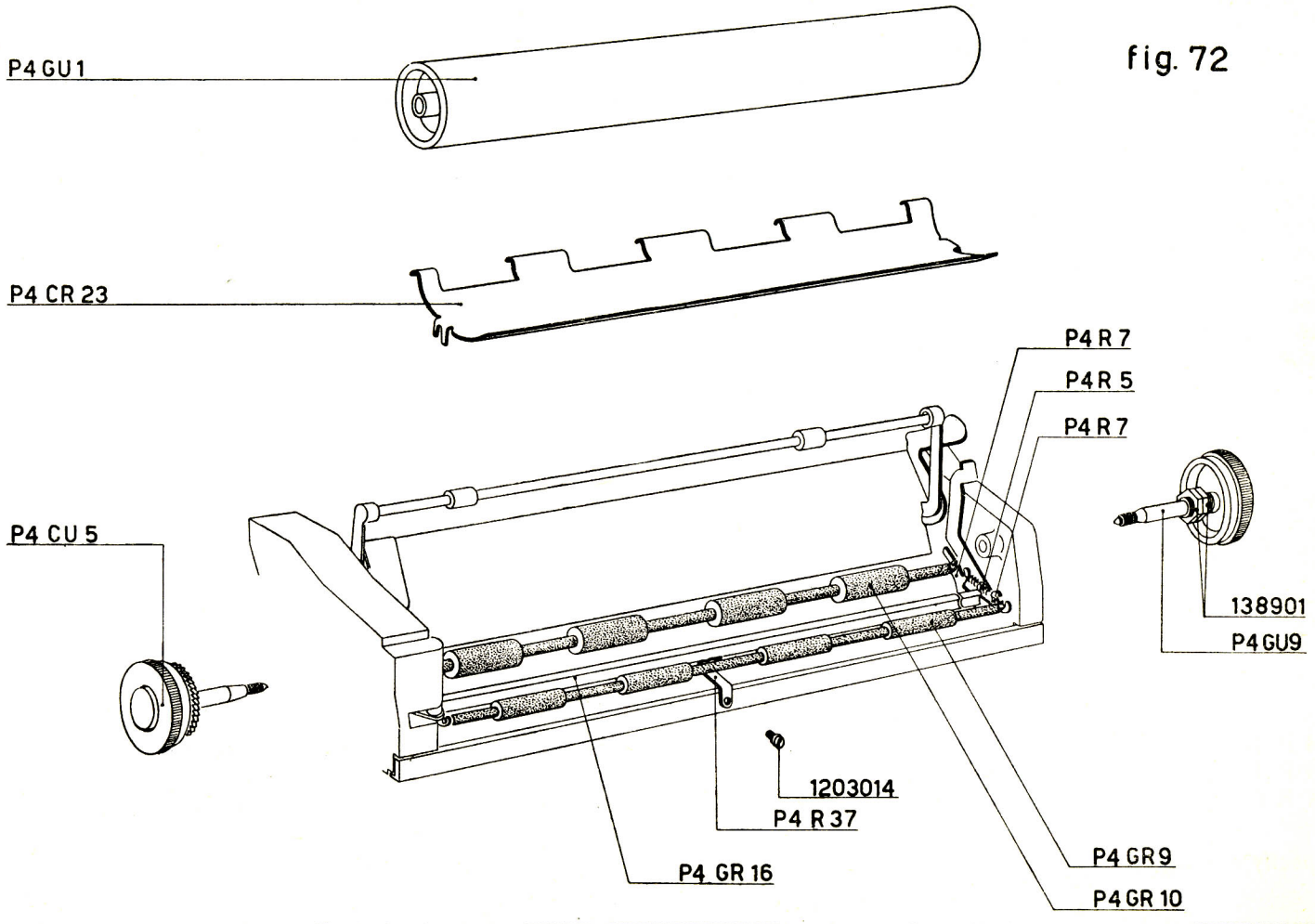

P4 GU 1
P4 CR 23
P4 R 7
P4 R 5
P4 R 7
P4 CU 5
138901
P4 GU 9
1203014
P4 R 37
P4 GR 16
P4 GR 9
P4 GR 10

fig. 72

65 -

Adjustment of line spacing.

a) Bring the line space selector lever to position one. Move the line spacing control lever and make sure that the tooth of pawl **N** falls exactly on the middle line of the two teeth of the line spacing wheel. This condition is obtained by moving the graduated sector P4 U 53 as required (figure 59).

b) Bring the line space selector lever to position four. Move the line spacing control lever and check that the platen completes the expected five pitches. Leave the platen in this position, release the control lever and let it return to rest. The platen should remain stationary when the platen knob is manipulated. This check is necessary to ensure the platen has turned exactly five pitches.

The required condition is obtained by raising or lowering the pawl stop regulator P4 U 41.

66 - FIGURE 73

a) Assemble the protection plate P4 R 6 on the front of the movable guide. This is secured with the screws **A** and **B** (which hold the rail of the front guide on the movable guide) and with another two screws 120 30 7.

b) Loosen the two screws 125 30 10 and P4 P 13. Place the lower slot of the line guide indicator P4 P 11 between the fixed guide and washer 40 36 14.

Slide the movable guide and make sure that the line guide indicator brushes without absolutely touching the two sides of the movable guide itself. If necessary, adjust their position by careful bending.

67 - Remove the bar connecting the sides UA 8178/1 (figure 14).

* P4 P 11	Graduated indicator	120 30 7	Special screw for P4 R 6
P4 P 13	Special screw for P4 P 11	125 30 10	Special screw for P4 P 11
P4 R 6	Front protective plate	40 36 14	Washer for P4 P 11

* Specify spacing.

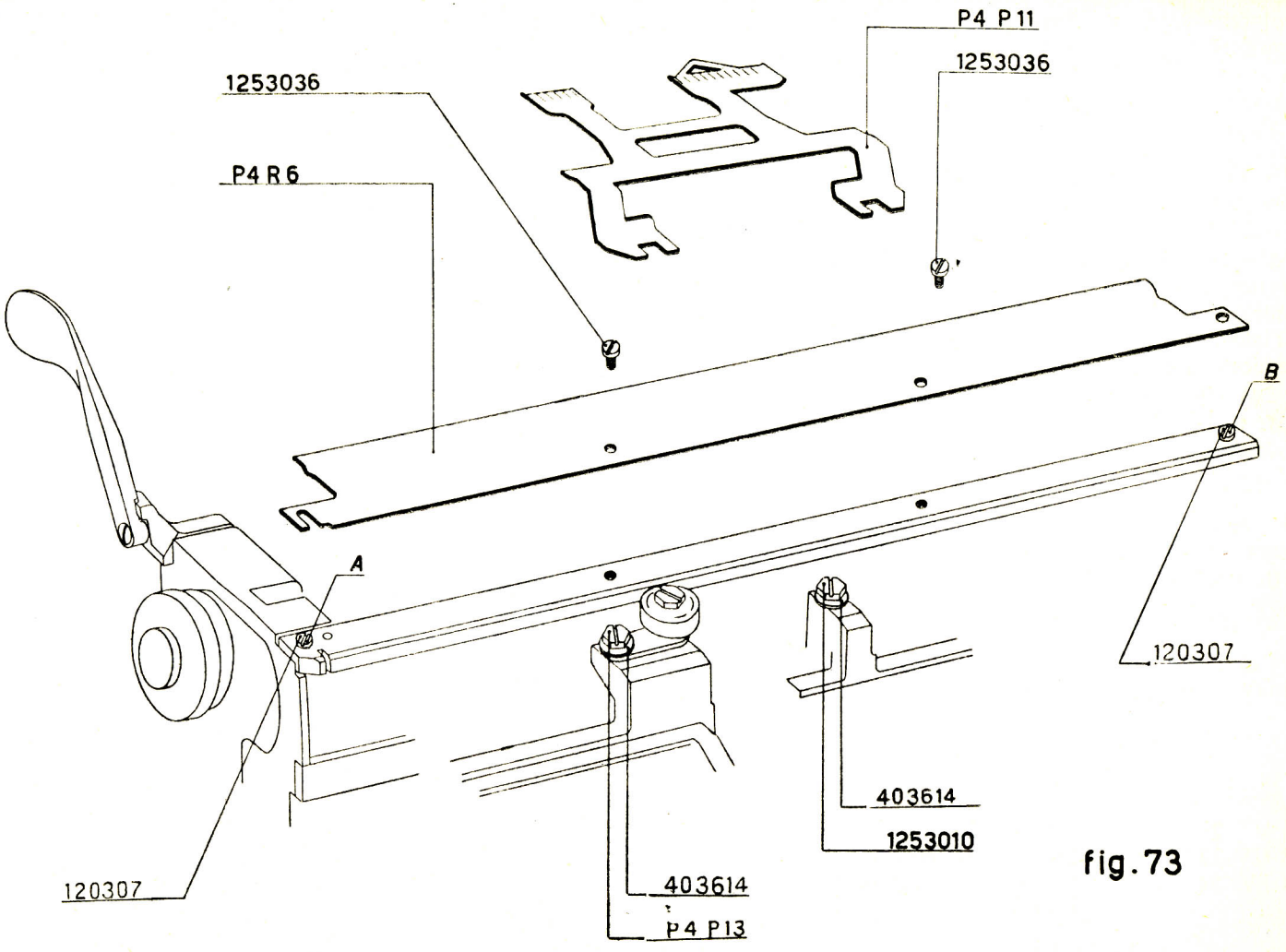

P4 P11
1253036
1253036
P4 R6
B
A
120307
403614
1253010
403614
P4 P13
120307

fig.73

68 - FIGURE 74

Set the carriage on the machine. The four special projections on the fixed guide should rest on the four regulators P3 I 12 which have previously been screwed on to the sides of the machine (figures 12 and 13).

Secure the carriage with four screws 120 35 5 with washers 40 36 14 in between.

69 - With the carriage set on the machine, its sides are now in their permanent position.

a) Check again the axial play of the shaft with arms of the shift mechanism P4 G 9 (figure 19). There should be none. Obtain this condition by adjusting the two conical support screws 129 40 4 as required.

Make sure that the type bar segment has complete freedom of movement.

b) Check again the axial play of the ribbon carrier shaft P4 L 8 (figure 35). It should be a minimum and the shaft should rotate freely. This condition can be obtained by adjusting the two support screws 129 40 4 as required.

70 - Assemble the spools on the ribbon carrying the unit. Insert the ribbon in the ribbon carrier. Secure the spools with buttons P3 L 19.

71 - FIGURE 75

a) Hook link P4 V 2 to the setting and clearing crank P4 GV 23 in the direction shown in the figure.

b) Hook the other eye of the link to the lever riveted on bracket P4 EV 24. Place the latter on the left side of the key lever bracket and secure it with two screws 120 30 3 which should only be partially screwed in.

72 - N. B. The fixed guide of the carriage rests on four special regulators screwed on the sides of the machine. The carriage has therefore, assumed a particular position.

Three distinct adjustments must be made; these are:

— the impact or striking of the type bars, on the segment and on the platen;

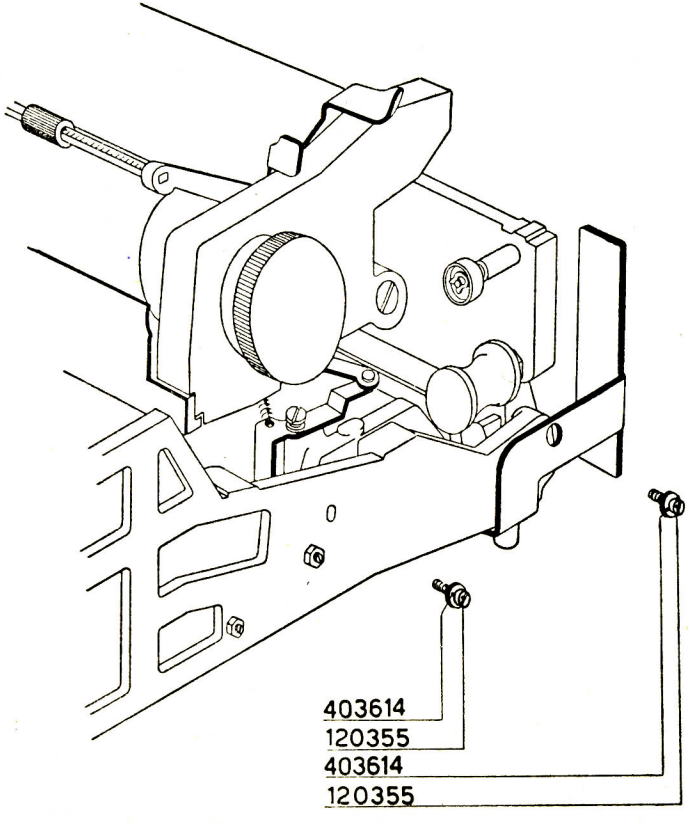
— the release of the type bars;

— line of writing on capitals.

These adjustments are indirectly connected with each other, and it is quite easy when obtaining one set of required conditions, to exceed the tolerance prescribed for another. For example, to obtain uniformity of the impact on the segment and on the platen, the depth of the carriage must be adjusted; to obtain the level for capital letters, the carriage must be raised. The second adjustment may upset the first. It is, therefore, necessary to make the final adjustments by degrees after having first made adjustments of a temporary nature.

P4 V 2	Setting and clearing control link
P4 GV 23	Setting and clearing crank
P4 EV 24	Setting and clearing control lever bracket
120 30 3	Cheese head screw for P4 EV 24
120 35 5	Cheese head screw securing carriage
40 36 14	Washer for 120 35 5

fig. 74



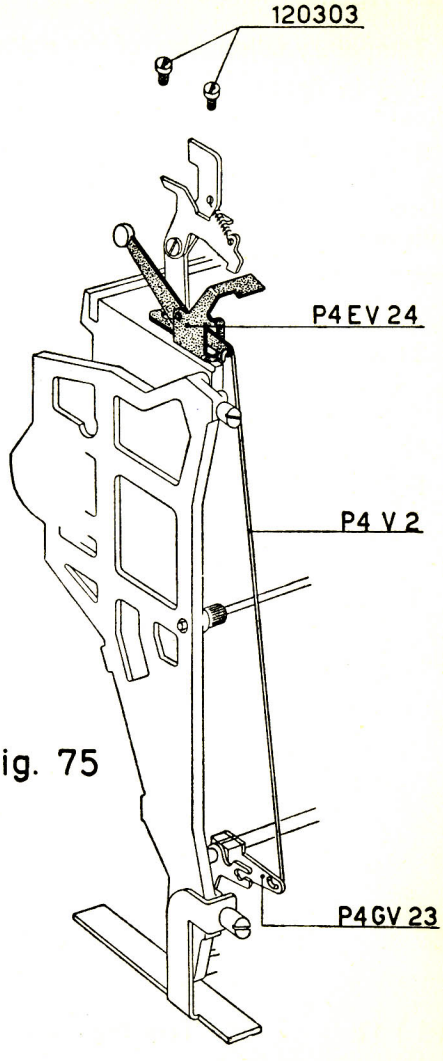


fig. 75

73 - FIGURES 76 - 77 and 78

Temporary adjustment of the points of impact.

a) In figure 76, the platen and the fixed guide are shown diagramatically. The latter rests on the front regulators **A** and on the rear ones **P**.

b) The point of impact of the type bars against the platen and against the segment should be adjusted as follows:

	on platen	on segment
1 sheet of paper on platen (thickness: 0,08 mm.— 0,0031 of an inch.)	yes	yes
ribbon	yes	yes
paper feeler (thickness 0,08 mm.— 0,0031 of an inch.)	yes	yes

To test the impact on the platen (figure 77), press the type bar gently at the point of contact with the stop tenon on the segment.

To test the impact on the segment (figure 78) press the type bar gently at the point of contact with the platen.

c) The paper feeler should be held equally at the segment and at the platen. If there is no impact on the platen, the platen itself must be brought forward. The rear regulators **P** must be screwed in further.

If there is no impact on the segment, the platen must be moved backwards. The regulators **P** must be unscrewed. The latter must always be screwed or unscrewed the same amount; this is absolutely necessary to ensure that they all remain in contact with the support projections on the fixed guide.

d) The impact should be tried out on the capitals and on the small letters; where there is a difference between the two positions of the type bar segment, the adjustment should be made preferably in the capitals position.

e) To move the platen, the four screws which secure the carriage to the sides, of the machine must be loosened. Gradually, and as the movement of the carriage is carried out and the checks effected, the screws should be screwed in thoroughly.

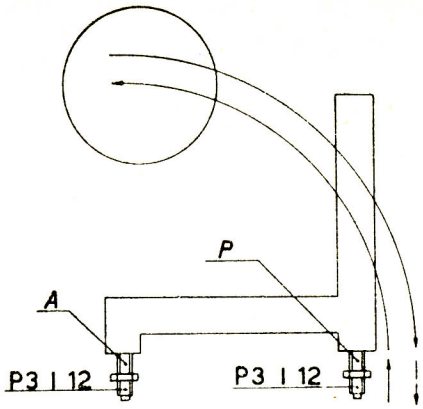


fig. 76

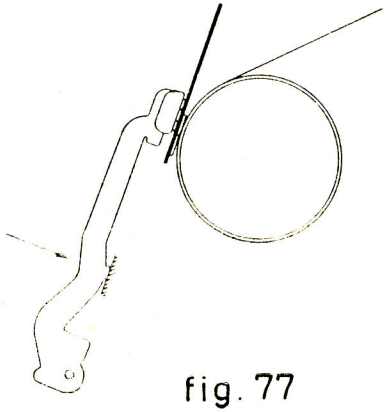


fig. 77

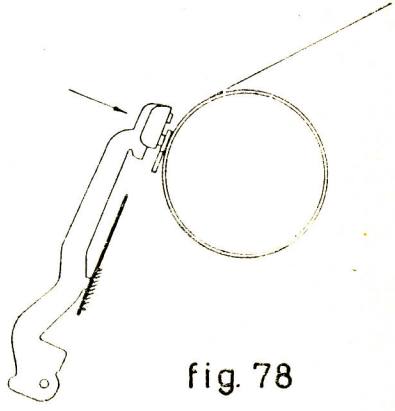


fig. 78

74 - FIGURE 79

Temporary adjustment of the trips.

The first trip of the escapement should occur when the type bar is 2 ÷ 7 mm. (0.08 ÷ 0.29 of an inch.) from the platen.

This condition is reached by adjusting as required the regulator P3 I 12 screwed on to the fixed tooth P4 EI 10.

75 - Set the two-colour change lever to blue. Adjust the angle of the second ribbon lift crank P4 GL 49 (figure 38) in relation to its shaft so that the ribbon can print. This adjustment, if such it can be called, has the sole object of rendering possible the operation which follows. The final adjustment of the two-colour device will be made after.

76 - FIGURE 80

Level of Capital Letters.

a) Strike all the capital letters and the numbers gently. The printing on the paper should be uniform, i. e. equally marked at the top and the bottom.

b) If the printing is lighter at the bottom, the platen is too high, the front regulators **A** must be lowered.

If the printing is lighter at the top, the platen must be raised, screwing in further the same regulators **A**.

77 - Make the final adjustments of the type bar impacts on the platen and segment according to instructions in paragraph 73.

78 - Make the final adjustments of the trips according to instructions in paragraph 74.

79 - Adjustment of the small letters - capitals level.

Strike successively a series of letters on the small letters and the capitals HhHh, XxXx, MmMm, WwWw.

The letters should be perfectly aligned.

N. B. The position of the movable type bar segment is determined with a special tool. Its path is fixed with the special feeler 6,6 mm. (0.25984 of an inch.) thick.

If the alignment between the capitals and the small letters is not as desired, only the level of the capitals should be slightly retouched and that of the small letters left unchanged. This retouching is negligable and does not compromise the adjustment of the impact, the trips and the capital letter level.

Therefore:

— if the capital letters are lower than the small letters, the path of the movable type bar segment must be reduced: screw in, to an equal extent, the two lower stop regulators P4 G 11 (figure 21);

— if the capital letters are higher than the small letters the path of the movable type bar segment must be increased. Unscrew to an equal extent the two regulators mentioned, P4 G 11.

80 - Carry out the alignment of the type in the usual way.

P4 GE 20	Universal frame complete
P4 EI 10	Rocker plate of escapement, with frame
P3 I 12	Trip regulator
138 30 5	Hexagonal nut for P3 I 12

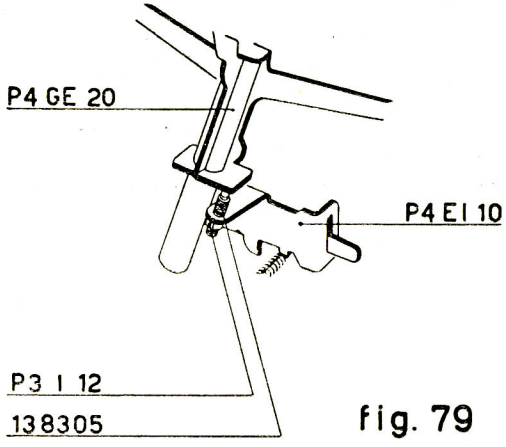


fig. 79

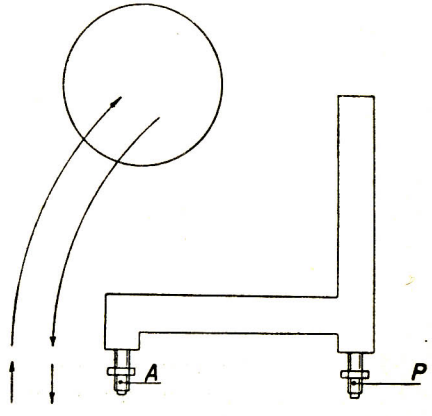


fig. 80

81 - FIGURES 81 - 82 - 83 - 83a and 84.

Adjustment of two-colour device.

a) Place the two-colour change lever P4 GL 44 in the neutral (stencil) position (figure 81). Lower the levers of keys **L** which transmit the movement to the correspnoding first movement levers **L1**. The latter, through their rear shank, cause the ribbon operation control lug P4 BL 1 to turn. During the rotation, the horizontal slot in its right arm should not interfere with pin **P** of pull rod P4 EL 46. To obtain the required condition:

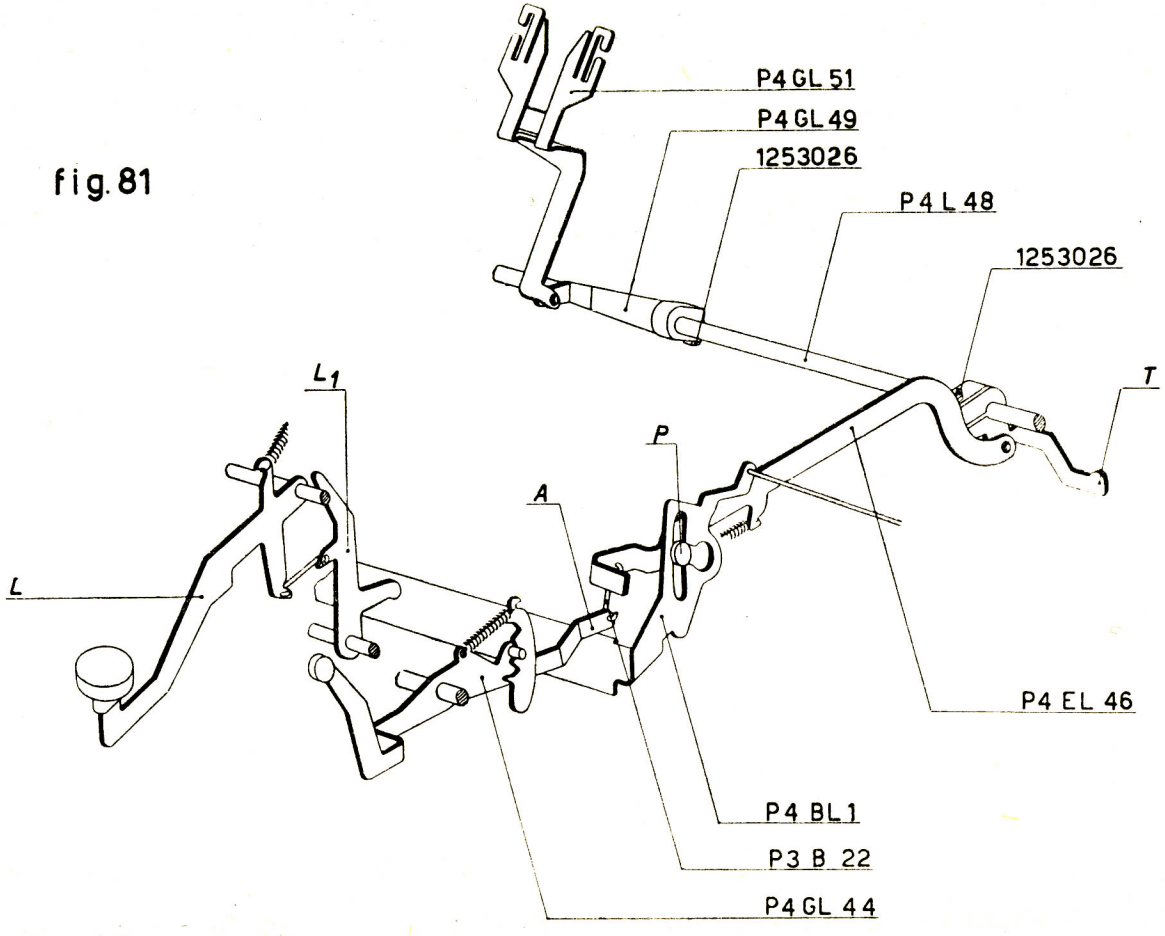
— check the parallelism of pull rod P4 EL 46 in relation to the right arm of the lug. If required, move the pull rod along its shaft P4 L 48;

— check that the ends of the slot do not touch the pin **P**. If they do touch, adjust the inclination of the rear part **A** of the two-colour change over lever P4 GL 44 by using pliers. In further detail: if the pin is touched above, lower part **A**; if it is touched below, raise it.

b) The tenon **T** of pull rod P4 EL 46 should be in contact with the lower face of the right side of the machine. If necessary, correct its position. When the required condition is reached, tighten securely screws 125 30 26 on the clamp of the pull rod P4 EL 46 (figure 81).

P4 L 48	Ribbon lift shaft
P4 BL 1	Ribbon operation control lug complete
P4 GL 44	Two-colour change over lever
P4 EL 46	First ribbon carrier crank with pull rod
P4 GL 49	Second ribbon carrier crank
P4 GL 51	Ribbon carrier
P3 B 22	Links for key levers
125 30 26	Special screw for P4 GL 51 - P4 EL 46

fig. 81


P4 GL 51
P4 GL 49
1253026
P4 L 48
1253026
T
L1
P
A
L
P4 EL 46
P4 BL 1
P3 B 22
P4 GL 44

c) Raise the underscore type bar (6). It should arrive at the point shown in figure 82. The line of the underscore should be 0,8 ÷ 1 mm. (0.031 ÷ 0.04 of an inch.) higher than the upper edge of the ribbon. This adjustment is made by moving the second ribbon carrier crank P4 GL 49 as required (figure 81). When the regulation is effected, tighten up screw 125 30 26 of P4 GL 49.

d) Bring the two-colour change lever to black. Set the movable type bar segment on capitals.

When the keys are struck, the pull rod P4 EL 46 is moved forwards by lug P4 BL 1. Stank **A** of the pull rod, at the end of the stroke, is stopped by the lower eccentric P4 L 43 (1) (figure 83). The condition shown in figure 83a should be reached by raising the type bar by hand. The type should be 1 mm. (0.04 of an inch.) lower than the upper edge of the ribbon.

The adjustment is made by moving eccentric **I** previously mentioned, as required. If this is not effective, the position of shank **A** of pull rod P4 EL 46 must be corrected.

e) Bring the two-colour change lever to red. Keep the type bar segment on small letters. The condition shown in figure 84 should be reached; the type bar is flush with the upper edge of the ribbon. This adjustment is made by manipulating the upper eccentric **S** P4 L 43.

f) Make printing tests. Check that the ribbon does not smudge and that when on neutral (stencil) position, it makes no impression whatever.

P4 L 43 Eccentric for ribbon carrier stop

P4 BL 1 Ribbon operation control lug complete

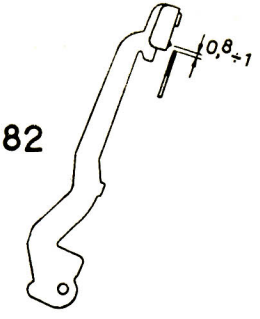


fig. 82

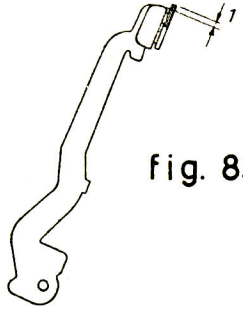


fig. 83a

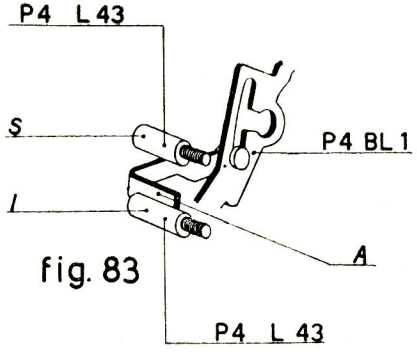


fig. 83

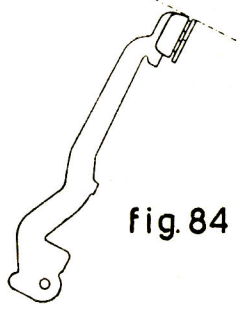


fig. 84

82 - FIGURES 85 and 85a

Adjustment of Shift Mechanism.

a) Regulate, with the eccentric M3 Q 10, the idle stroke of the shift keys, which should be minimum. This minimum, which is obtainable by adjusting the eccentric, will always be greater than the 1 mm. (0.04 of an inch.) required as idle stroke.

b) Reduce an excessive idle stroke by lowering bracket P4 EV 24.

c) Using pliers or setting tool, hend the shank **A** of the shift arm so that the type bar segment is locked on the small letters by the pressure exerted by the shank on the lower part **I** of the suspension rod P4 E 15.

The following conditions should be reached:

— the type bar segment locked on the small letters;

— there is no interference between the two opposed levers on changing from small letters to capitals;

— there should be the clearances indicated in figure 85a, between these levers.

d) Lower the capitals key slowly. The key should make the prescribed idle stroke of 1 mm. (0.04 of an inch.). It will then start moving the type bar segment. The latter stops as soon as shank **C** of its bracket makes contact with the lower rubber cap P4 G 12.

Lower the capitals key once more; the flexible coupling should function; this can be seen by observing the tension of spring M2 H 14. The tension is relieved when pin **P** is stopped at the bottom of the slot of pull rod P4 G 4 into which it is fitted.

Return the segment to the small letters position.

e) Lower the shift by pressing slowly the shift lock key M2 G 26. The lower shank **D** of lever P4 G 16 makes contact with edge **E** of bracket P4 EV 24 and subsequently slides down same. It should hook on almost at the end of the stroke of the flexible coupling, i. e. a little before pin **P** stops. This condition can be reached by adjusting, with a pair of pliers, the position of the inclined edge **E**.

The hooking position of the shift lock key is correct when it is obtained by lowering the right hand capitals key.

f) Place weights of 45 gr. on the shift keys and to one of them add a weight of 130 gr. The type bar segment should become slightly lowered. If a second weight of 130 gr. is added to the other key, the lowering of the segment should be obvious and decisive.

Remove one of the two 130 gr. weights; the segment should rise a little. Take away the other 130 gr. weight and the segment should return decisively to its rest position in spite of it being weighted with the original 90 gr.

P4 E 15	Left hand type bar segment suspension rod
P4 G 4	Shift pull rod
P4 G 9	Shift shaft with arms
P4 G 11	Shift regulator
P4 G 12	Rubber cap for shift regulator
P4 G 16	Shift lock lever
P4 GG 3	Shift frame
P4 EV 24	Setting and clearing control lever bracket
M2 GB 30	Key top
M2 G 25	Shift key
M2 G 26	Shift lock key
M2 H 14	Spring for shift flexible joint
M3 Q 10	Eccentric connecting stud for shift pull rod

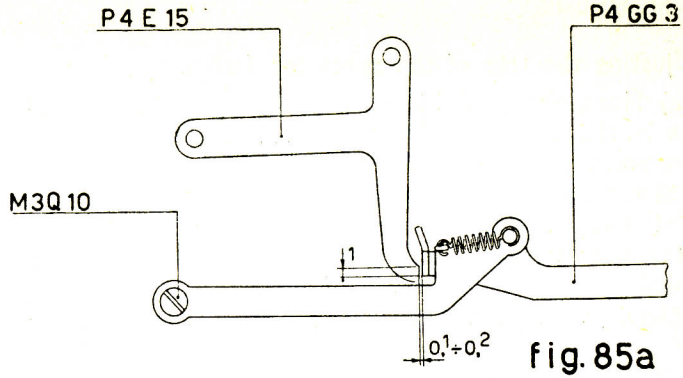


fig. 85a

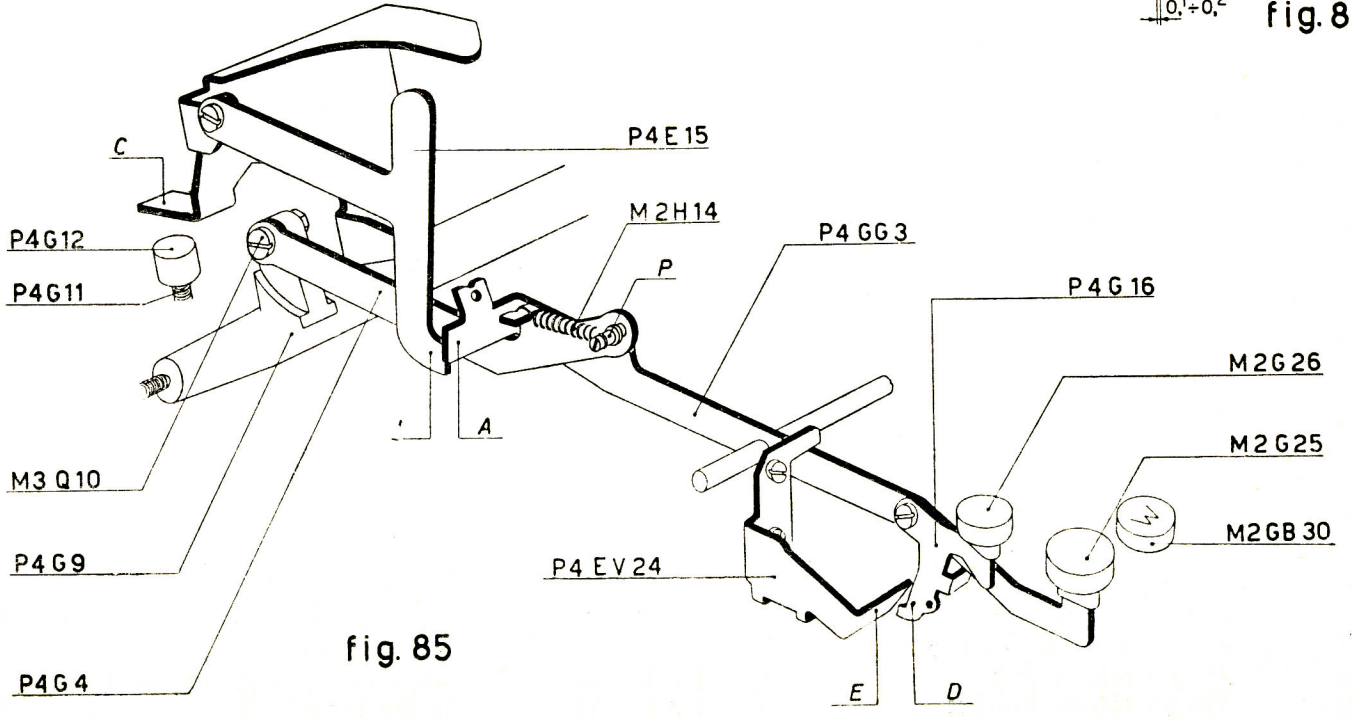


fig. 85

83 - FIGURE 86

Adjusting the trip of the space bar frame.

a) Hook spring N3 I 11 between the space bar control frame P4 H 3 and the bracket P4 V 73. Adjust the angle of the space bar control lever P4 GH 7 so that the first trip of the escapement comes at half stroke of the space bar. If a 60 gr. weight is applied on the latter, no movement should be observed. If a further 160 gr. weight is added, the space bar should be lowered sharply, tripping the carriage. When the 160 gr. weight is removed, the bar should return to its rest position, although weighted with the original 60 gr.

84 - FIGURE 87

a) Connect the margin release control lever P4 Q 4 and the margin release bracket P4 Q 2 by means of link P4 Q 1.

b) Connect the key lever, locking frame P4 Q 10 and the locking control lever P4 EQ 8 with pull rod P4 L 27.

c) Using a pair of pliers, close the seats in which the link and the pull rod are resting.

P4 H 3	Space bar control frame
P4 GH 1	Space bar
P4 GH 7	Space control lever
P4 L 27	Lug connection pull rod
P4 Q 1	Margin release link
P4 Q 2	Margin release bracket
P4 Q 4	Margin release lever
P4 Q 10	Key lever locking frame
P4 EQ 8	Keyboard locking lever with frame locking shaft
P4 V 73	Stops and spring carrying bracket
N3 I 11	Spring for P4 H 3

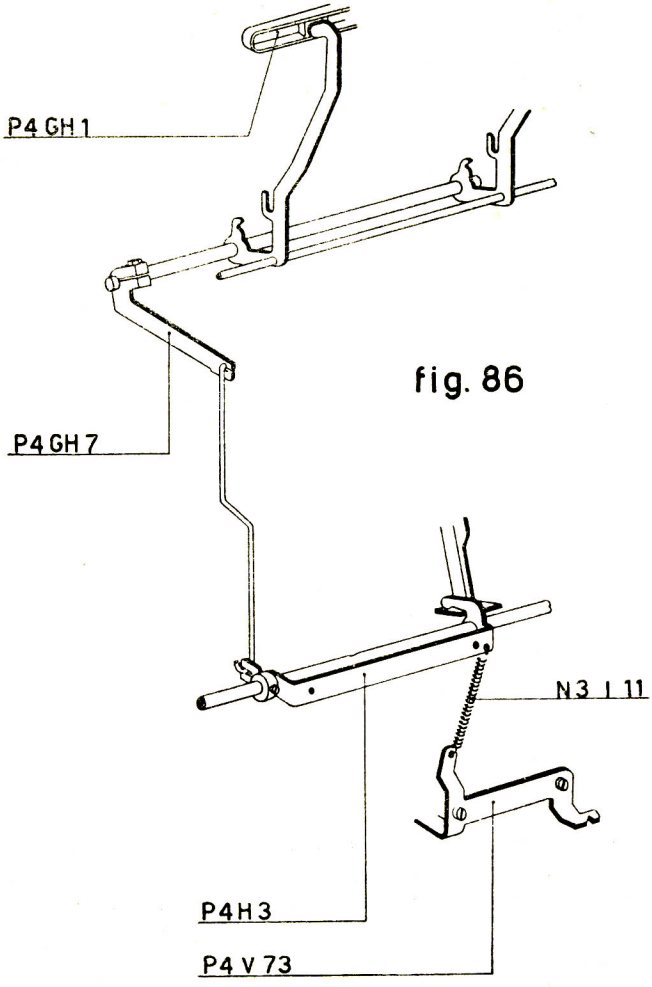

P4 GH 1
P4 GH 7
N3 I 11
P4 H 3
P4 V 73

fig. 86

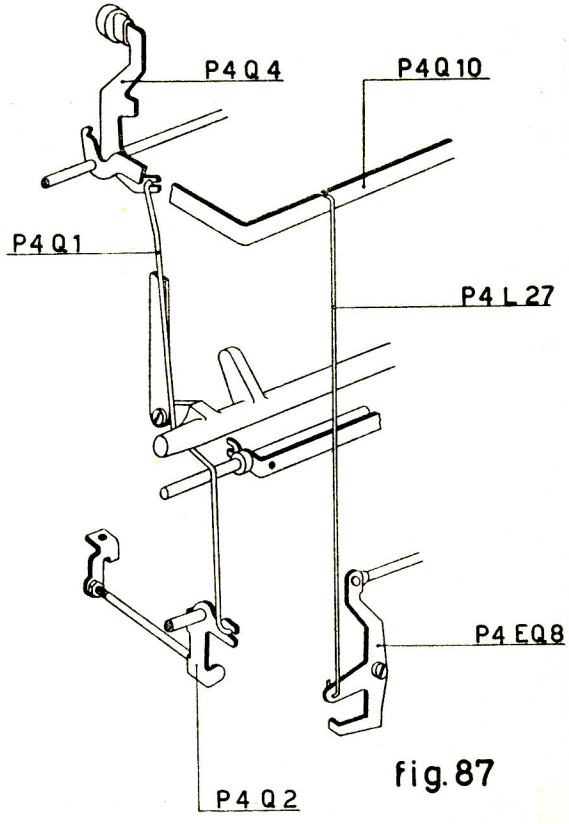

P4 Q 4
P4 Q 10
P4 Q 1
P4 L 27
P4 EQ 8
P4 Q 2

fig. 87

85 - FIGURES 88 - 89 - 90 - 91 and 92

Adjustment of margin release rod P4 GQ 30.

a) Figure 88. The link M2 Q 38 should be vertical. If necessary, move the setting and clearing crank P4 GV 23 along P4 V 15.

Adjust the height of link M2 Q 38 so that the tenon **T** of the margin release rod barely makes brushing contact with the rear screws **V** of margin blocks when the margin release bracket P4 Q 2 is at rest.

b) Figure 89. Adjust the right hand regulator M2 Q 35. Keeping the margin release rod pressed up against it, a clearance of 9 mm. (23/64") should result as indicated in the figure.

Partially screw up the nut 138 40 5 of the adjusted regulator without locking it.

P4 Q 2	Margin release bracket	M2 Q 35	Headless support screw for margin release rod
* P4 GQ 30	Margin release rod	M2 Q 38	Upper vertical link of margin release
P4 V 15	Tabulator control shaft	138 40 5	Hexagonal nut for M2 Q 35
P4 GV 23	Setting and clearing crank		

* Specify spacing.

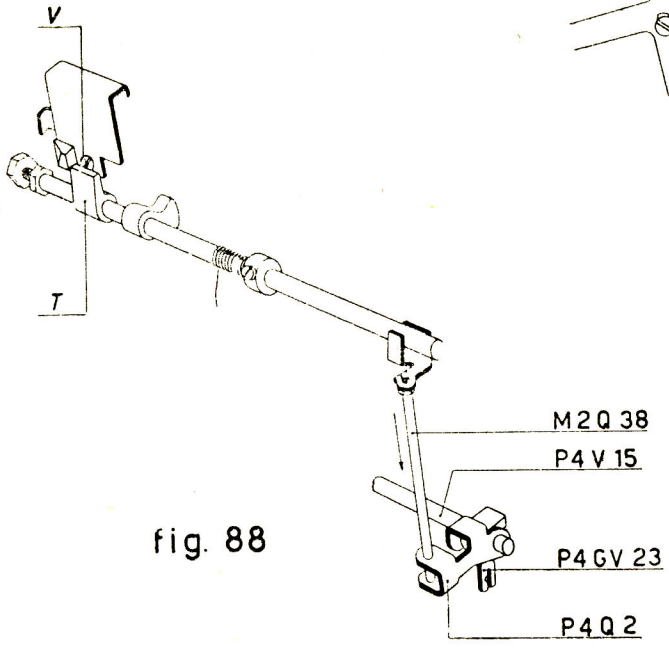


fig. 88

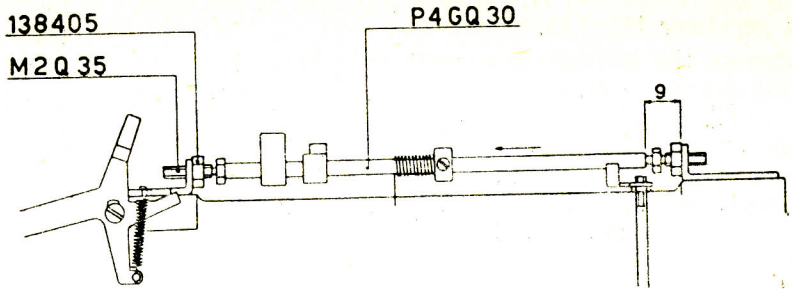


fig. 89

c) Figures 90 and 91. Final adjustment of the right hand regulator M2 Q 35.

— advance the carriage by operating the space bar. At the last space but one, a clearance of 0 ÷ 0,2 mm. (÷0,0008 of an inch.) should be seen between tenon **T** of the margin release rod and stop **T1** of the margin set. This distance is found when the shaft P4 GQ 30 is held in contact with the regulator M2 Q 35. The adjustment is made by moving the latter as required.

— if the adjustment has been exact, it should be observed that when the carriage is brought back to the beginning of a line, stop **T2** of the left hand margin set (figure 91) will hit the tenon **T** of the margin release rod; it will then recoil a distance of 1 mm. (0.04 of an inch.). This distance must be checked when rod P4 GQ 30 is held in contact with the right hand regulator M2 Q 35.

— tighten nut 138 40 5 of the regulator.

* P4 GQ 30	Margin release rod
M2 Q 35	Headless support screw for margin release rod

* Specify spacing.

138 40 5	Hexagonal nut for M2 Q 35

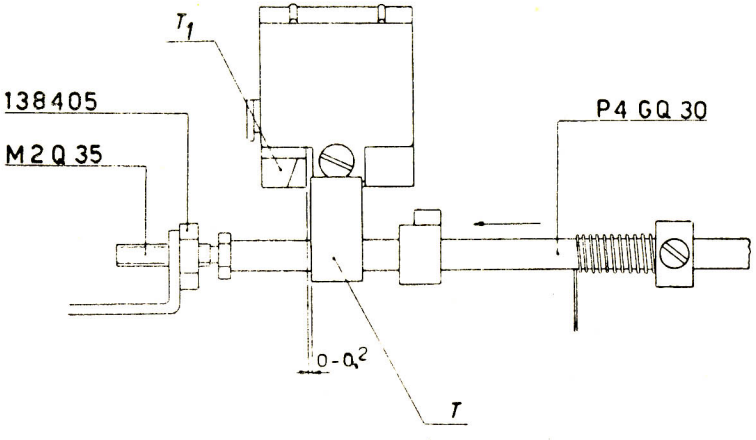


fig. 90

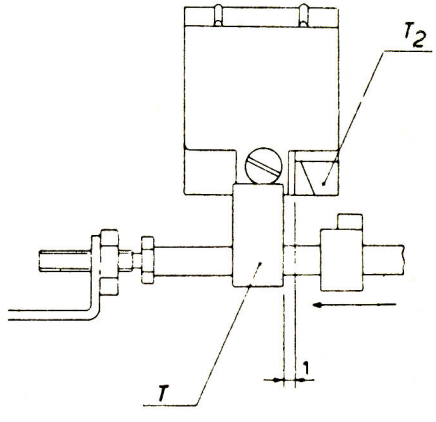


fig. 91

d) Figure 92. Adjust the left hand regulator M2 Q 35 so as to obtain the clearance indicated in the figure.

86 - FIGURE 93

a) Keep the margin release rod P4 GQ 30 in contact with the right hand regulator M2 Q 35.

b) Move collar 142 51 8 so as to bring it to 0,05 ÷ ÷ 0,15 mm. (0,002 ÷ 0,06 of an inch.) from the keyboard locking vertical lever P4 Q 9.

87 - FIGURE 94

a) With the locking control lever P4 EQ 8 at rest, place the eccentric P4 Q 12 in the position shown in the figure (the projection **P** carries the fixed tooth spring).

b) Adjust the eccentric P4 Q 12. Moving the shaft of P4 Q 8 to the left, the eccentric should make brushing contact with the rear end of the universal frame P4 GE 20.

c) Lock screws 124 30 7 of eccentric P4 Q 12.

P4 GE 20	Universal frame complete
P4 Q 9	Vertical keyboard locking control lever
P4 Q 12	Frame locking eccentric
P4 EQ 8	Keyboard locking lever with shaft
* P4 GQ 30	Margin release rod

* Specify spacing.

M2 Q 35	Headless support screw for margin release rod
120 30 14	Cheese head screw for 142 51 8
124 30 7	Grub screw for P4 Q 12
138 40 5	Hexagonal nut for M2 Q 35
142 51 8	Collar for P4 GQ 30

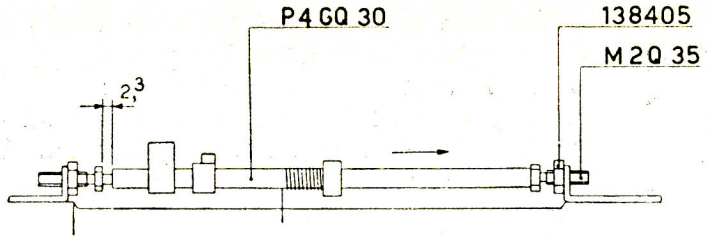


fig. 92

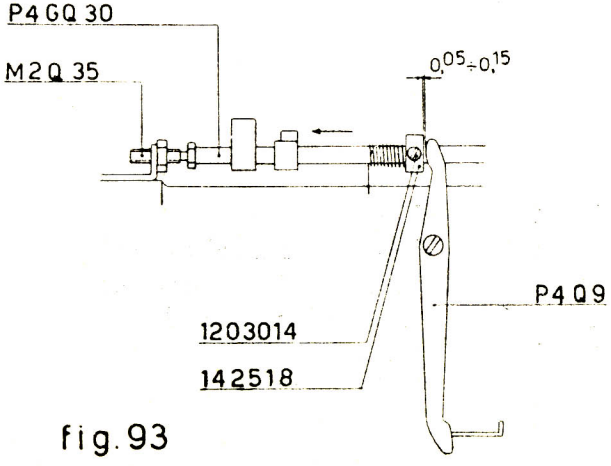


fig. 93

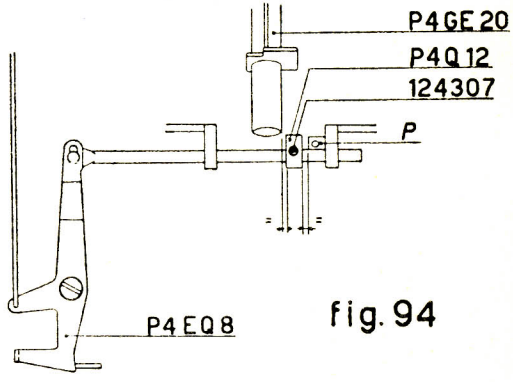


fig. 94

88 - FIGURE 95

a) Connect the back space control lever P4 N 1 and the back space frame P4 EN 6 by means of pull rod P4 N 2.

b) Connect the tabulator control lever P4 V 1 and the tabulating frame P4 EV 12 with pull rod P4 V 3.

c) Using a pair of pliers close the seats where the pull rods are resting.

89 - FIGURE 96

Adjustment of back spacing.

The back space control key lever P4 N 1 should rest on the stop lever P4 A 10. The pawl **A** of the back space frame P4 EN 6 should not, when at rest, be in contact with guide stud M2 N 9, but must be 0,1 ÷ 0,2 mm. (0.004 ÷ 0.008 of an inch.) away from it. This avoids the metallic sound made by the pawl at the end of its return path.

The distance is adjusted shortening the pull rod P4 N 2, by careful bending, and then checking the angle between the upper and lower arms of frame P4 EN 6.

P4 A 10	Leather lever stop	
* P4 GI 6	Escapement wheel and cogwheel	
P4 N 1	Back space key lever	
P4 N 2	Back space pull rod	
P4 N 7	Back space and tabulator first movement lever	
P4 EN 6	Back space pawl with frame	
P4 V 1	Tabulator lever	
P4 V 3	Tabulator control pull rod	
P4 EV 12	Tabulator frame with bracket	
P3 GN 12	Key for back space lever	
M2 N 9	Large headed collet screw for back space	

* Specify spacing.

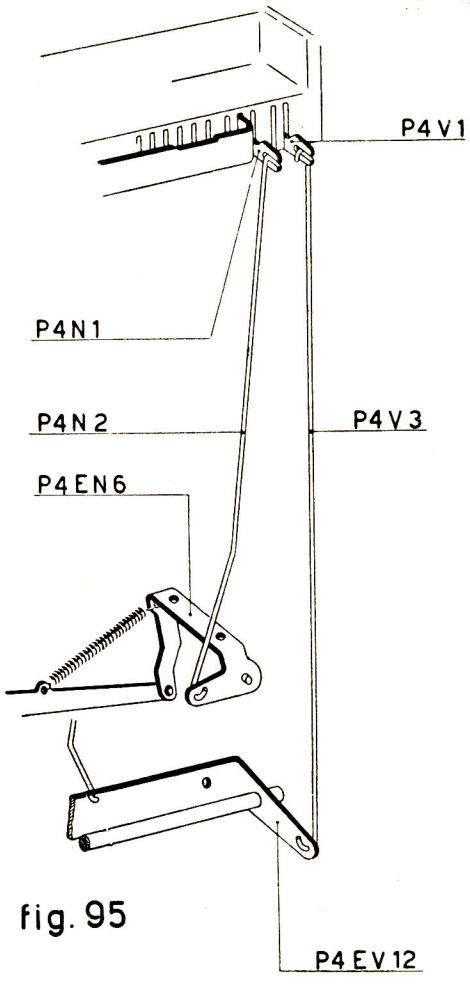

P4 V1
P4 N1
P4 N2
P4 V3
P4 EN6
P4 EV12

fig. 95

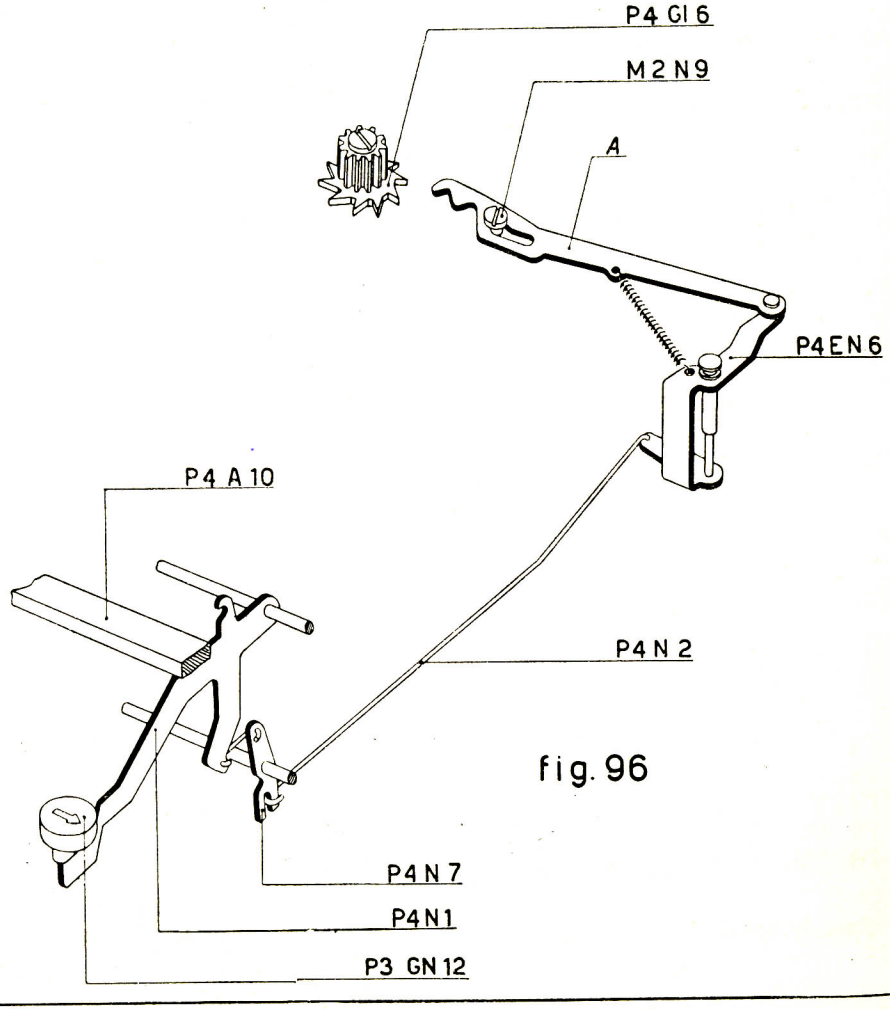

P4 GI 6
M2 N9
A
P4 EN6
P4 A 10
P4 N 2
P4 N 7
P4 N1
P3 GN 12

fig. 96

90 - FIGURES 97 - 98 - 99 and 100

Adjustment of the setting and clearing cinematic chain.

a) Figure 97. The tabulator finger P4 EV 13 should be 1 ÷ 1,5 mm. (0.04 ÷ 0.06 of an inch.) clear of stops M2 V 82. To obtain this clearance, use two setting tools and correct the position of the rear shank **A** of the tabulator frame P4 EV 12. The tools should be applied at points **X** and **Y**. With this operation, the shank is raised or lowered; as a consequence, the tabulator finger will be raised or lowered accordingly.

b) Bring the left margin set to the fifth space and the carriage all the way over to the right. In this position the setter P4 V 36 should be centered in relation to the first stop on the left. To effect this, move the setting and clearing control P4 GV 30 along the shaft P4 V 15.

P4 V 15	Tabulator control shaft
P4 V 36	Setter
P4 V 81	Plug for tube
P4 V 83	Coiled spring for stop tube
P4 EV 12	Tabulator frame with bracket
P4 EV 13	Tabulator finger
P4 GV 30	Setting and clearing control
* M2 V 82	Stop pins
125 30 26	Special screw for P4 GV 30

* Specify spacing.

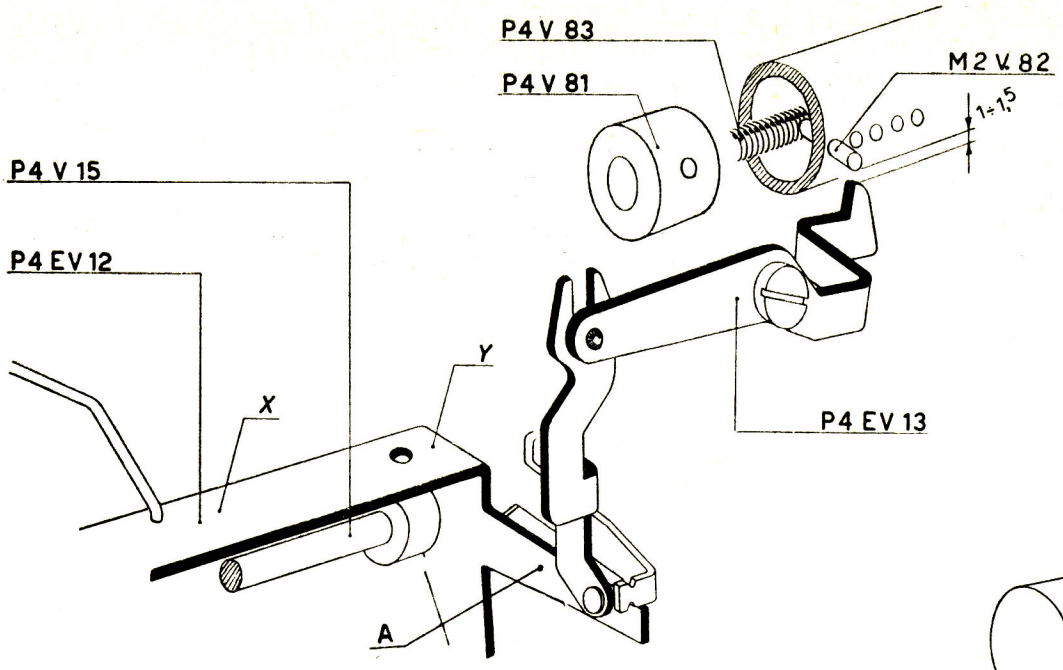

P4 V 83
P4 V 81
M2 V 82
1÷1,5
P4 V 15
P4 EV 12
Y
X
P4 EV 13
A

fig. 97

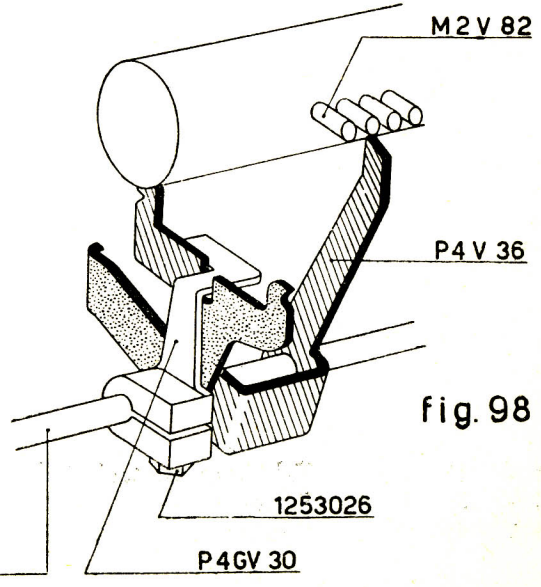

M2 V 82
P4 V 36
1253026
P4 V 15
P4GV 30

fig. 98

c) Figure 99. The upper shanks of the setter P4 V 36 and the clearer P4 V 41 should be centered, in their position of rest, with respect to the stops. In addition, there should be a clearance of 1 mm. (0,04 of an inch. between stops set and not set, as well as between stops set and cleared.

To centre the P4 V 36 and the P4 V 41 in relation to the stops tube, adjust the angle of the setting and clearing control P4 GV 30. At rest, the P4 V 36 and the P4 V 41 should rest on the stops of the bracket P4 V 73. To obtain the prescribed clearance of 1 mm. (0.04 of an inch.) correct, if necessary, the points of support of the bracket itself.

b) Figure 100. Adjust the angle of the setting and clearing crank P4 GV 23 and the shaft P4 V 15. The control lever **L** should set and clear the stops and have and additional safety margin of travel. This should be equally divided in relation to the stationary points of lever **L**.

P4 V 15	Tabulator control shaft
P4 V 36	Setter
P4 V 41	Clearer

P4 V 73	Stops and spring carrying bracket
P4 GV 23	Setting and clearing crank
P4 GV 30	Clearing and setting control

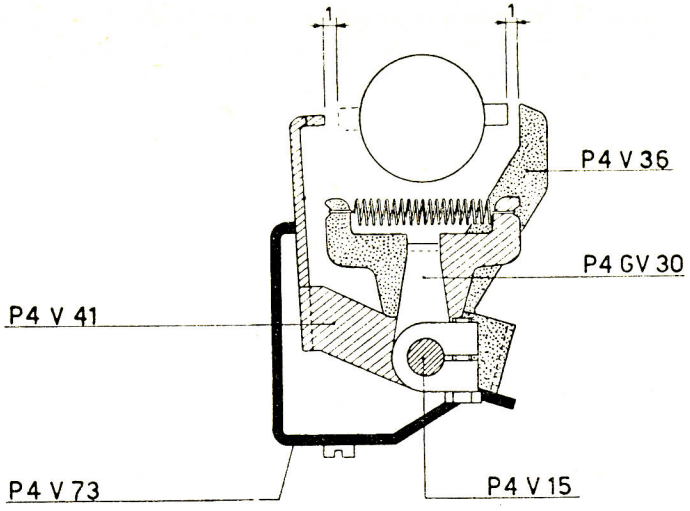


fig. 99

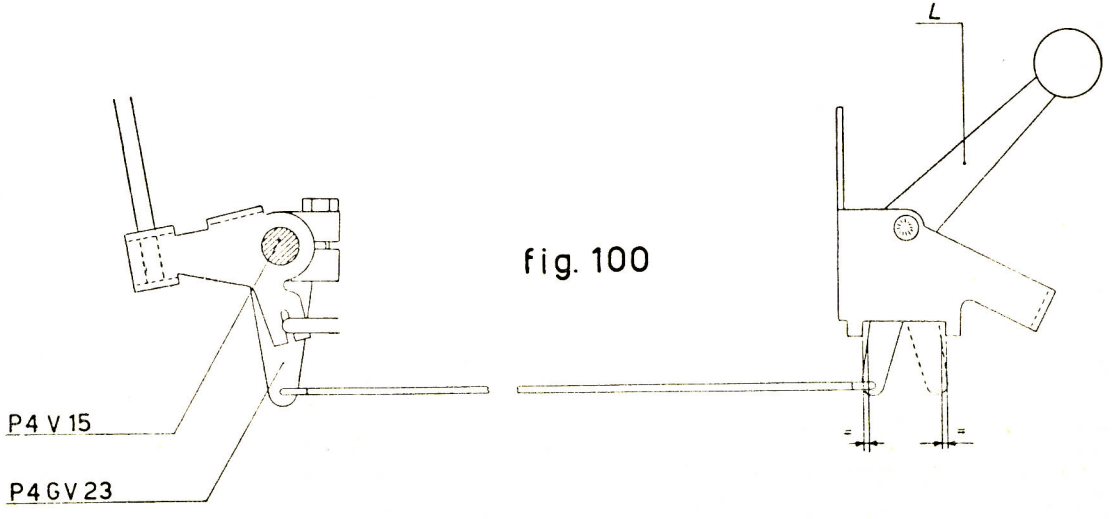


fig. 100

91 - FIGURE 101

In its position at rest, the cork pad P4 V 75 of brake P4 GV 74 should be at a distance of 0,5 mm (0.02 of an inch.) from the stops tube.

This condition is reached by adjusting the position of the arm **B** which rests on shank **A** of the tabulator frame P4 EV 12. By raising or lowering this arm, the cork pad is brought nearer to, or farther from, the tube.

92 - FIGURE 102

When the tabulator control key is lowered, lever P4 V 14 moves the movable tooth P4 I 11 disengaging it from the escapement wheel.

The brake should come into contact with the stops tube before the movable tooth has completely left the teeth of the wheel. Further, the movement of lever P4 V 14 should not be such as to bring the right hand end of the movable tooth in contact with the projection **P** of the fixed guide. It should have a certain safety clearance in relation to the latter, as is also required in adjusting the carriage release bracket.

These conditions are reached by increasing or decreasing the ben of link P4 B 24/1.

93 - FIGURE 102

When at rest, the tabulator key should rest on the lever stop leather. Adjust the points **K** and **H** of the frame P4 EV 12 with setting tool, if required.

94 - FIGURE 101

Check that the brake functions correctly. The carriage must not be over braked or excessively free to slide.

If necessary, increase or relieve the tension of spring M2 B 25.

P4 B 24/1	First movement link
P4 I 11	Escapement movable tooth
P4 V 14	Lever for disengaging movable tooth
P4 V 15	Tabulator control shaft
P4 V 75	Cork pad for carriage brake
P4 EV 12	Tabulator frame with bracket
P4 GV 74	Carriage brake
M2 B 25	Spring for P4 GV 74

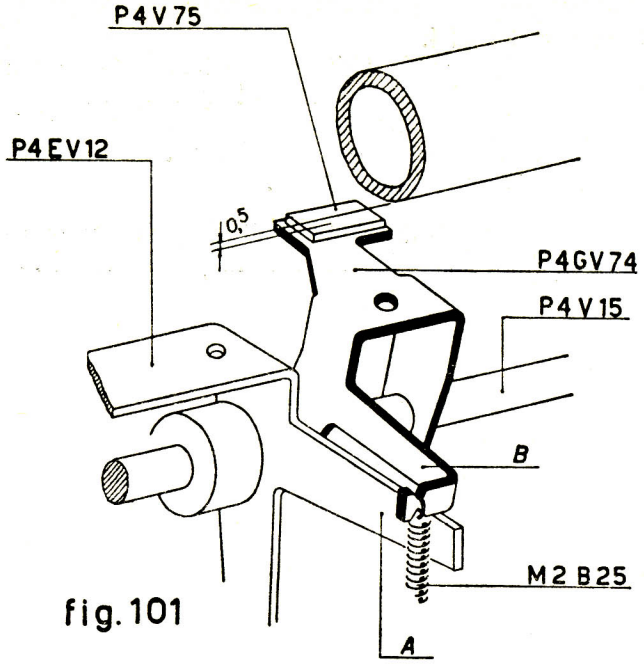


fig. 101

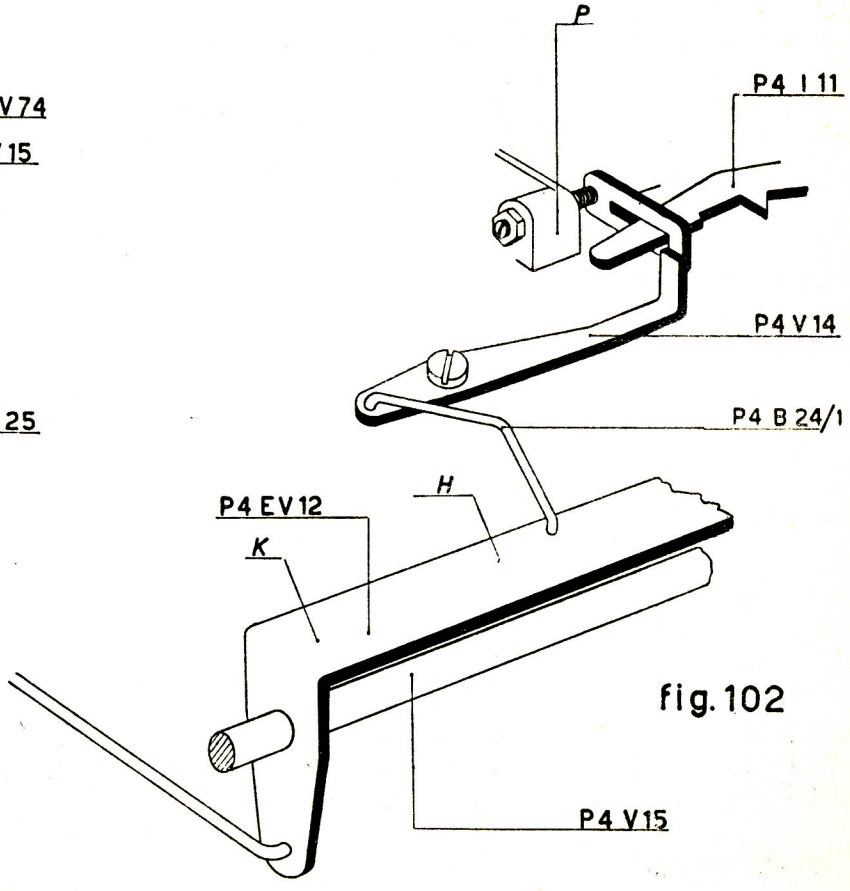


fig. 102

95 - FIGURES 103 and 103a

a) Bring the right hand margin set to the end of its travel. Slide the carriage along and check that there is a clearance of 0,2 mm. (0.008 of an inch.) between tenon **T2** of margin release rod and screw of safety stop when tenon **T** of the margin set comes into contact with tenon **T1** of the margin release rod.

This condition is reached by adjusting screw P4 T 24 as required.

b) The left hand margin set should be adjusted to the same clearance.

96 - FIGURE 104

Type a series of l.

With the line guide indicator in its normal printing position, the lower shanks of the l should be flush with the upper edge of the line guide indicator itself. In addition, the l and the notches of the indicator should be aligned on the same vertical.

97 - Check that the line guide indicators do not foul the sides of the movable guide and that they are parallel to the platen.

* P4 P 11	Graduated indicator
P4 P 13	Special screw for P4 P 11
P4 T 23	Left carriage safety stop
P4 T 24	Right carriage safety stop
138 35 1	Hexagonal nut for P4 T 23 - P4 T 24

* Specify spacing.

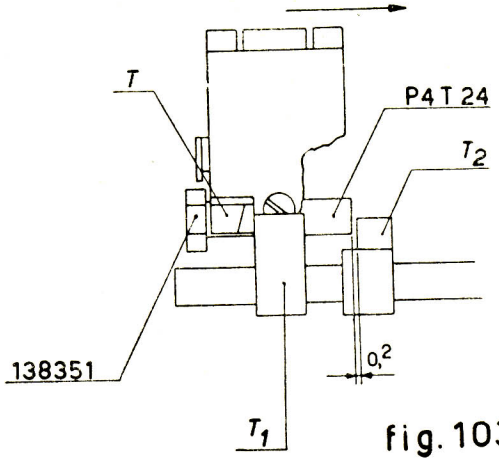


fig. 103

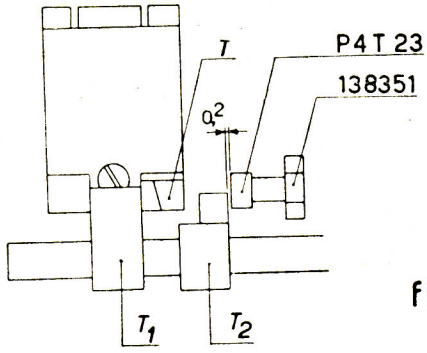


fig. 103a

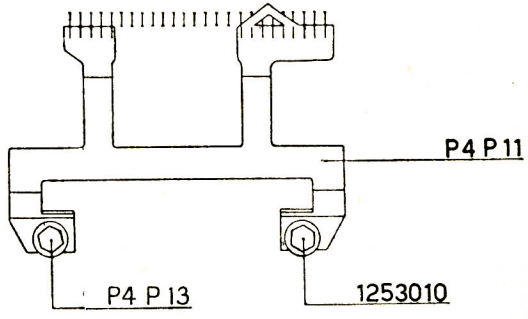


fig. 104

98 - FIGURES 105 and 105a

a) Arrange the spring P3 G 10 between the two articulated parts of the carriage locking bracket P4 EA 7. Mount the latter on the left side of the machine securing it with two screws 120 30 3 which should be partially screwed in and not tightened.

b) Place the locking lever in the hooking position. Adjust the height of bracket P4 EA 7 so that the rear shank of the locking lever makes light contact with the front rail of the movable guide **R**.

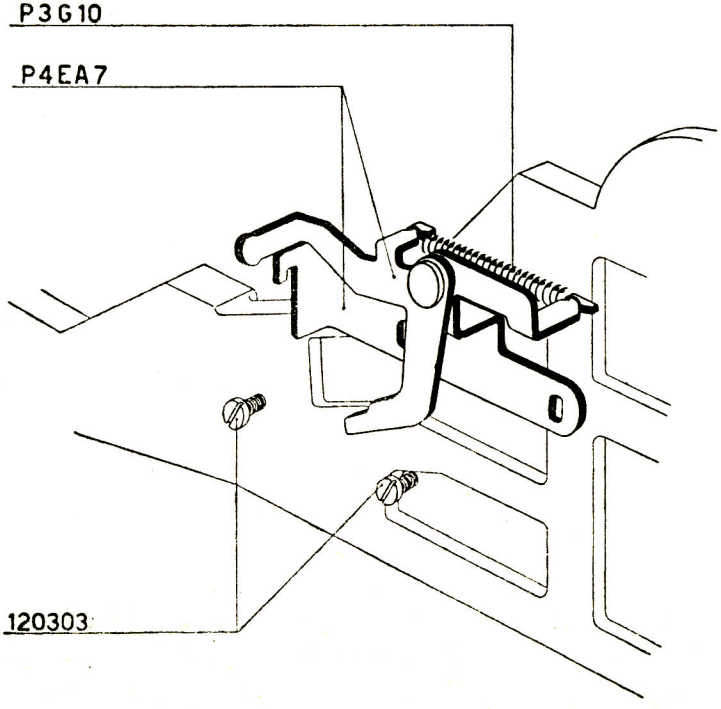
The lever is then inserted into the special slot in the rail.

Tighten up screws 120 30 3 thoroughly.

99 - Remove the iron feet and the temporary rear brackets.

P4 EA 7	Bracket with lever for locking carriage	120 30 3	Cheese head screw for P4 EA 7
P3 G 10	Spring for carriage stop hook		

fig. 105



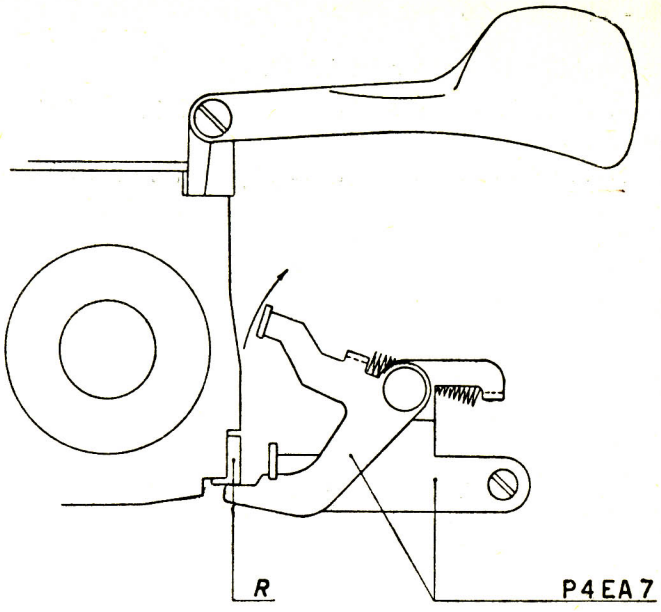


fig. 105a

100 - FIGURE 106

Assembling the cover P4 AA 17.

a) Place four rubber bushes P3 A 11 in the holes in the cover.

b) Move the carriage all the way over to the left.

c) Introduce the lower part of the cover from the left, fitting it into place on the machine.

d) Secure it with four studs 126 30 41, placing washers 40 40 6 in between.

e) Hook spring M2 R 6 on the snap lid of the cover. Fit the snap lid in place.

P4 AA 17	Cover with snap lid
P3 A 11	Rubber bush for fixing body
M2 GL 77	Ribbon spool
M2 R 6	Spring for snap lid
126 30 41	Cheese head stud screw for P4 AA 17
40 40 6	Washer for 126 30 41

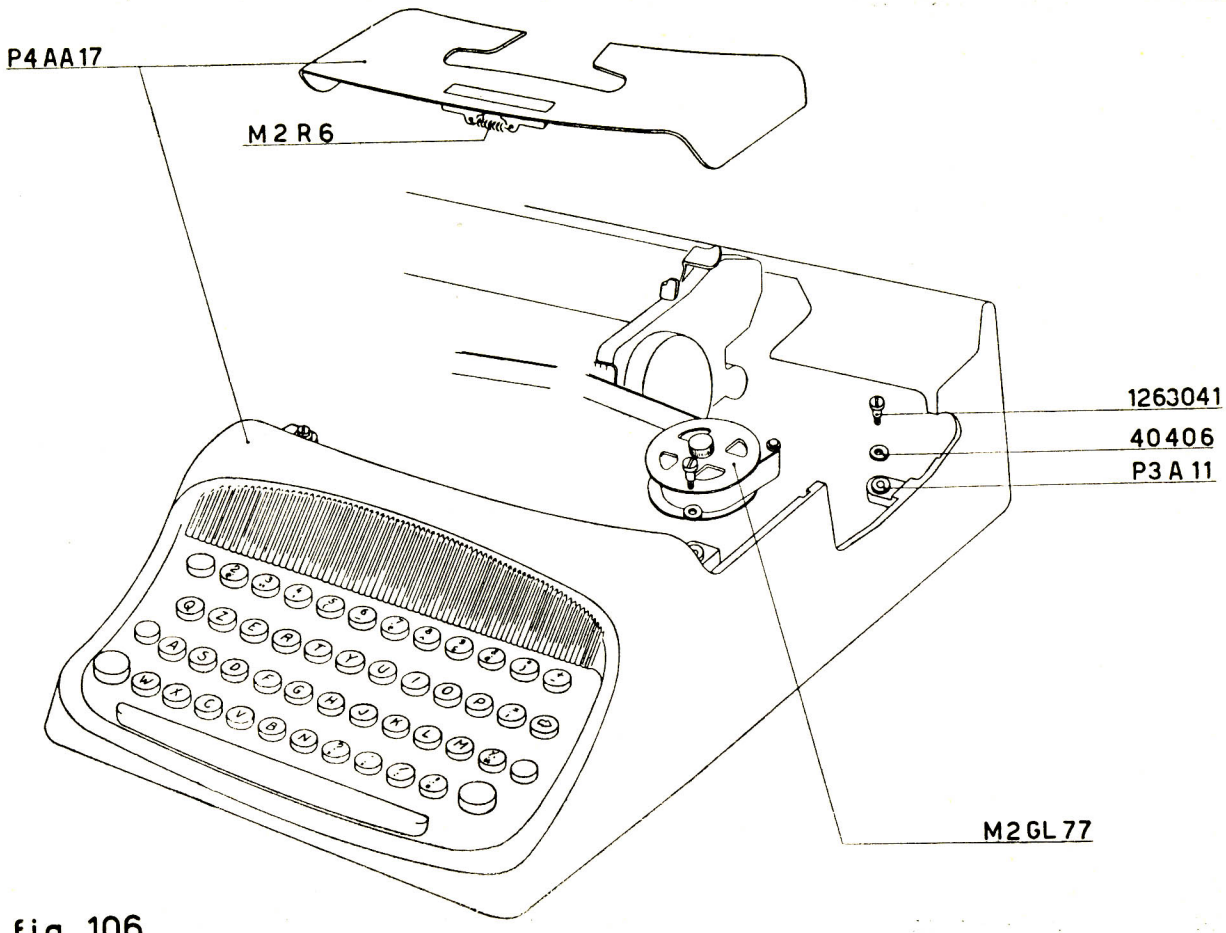


fig. 106

101 - FIGURE 107

Assemble the base plate P4 AA 22.

Fit the small plates P4 A 14 in the rubber feet P4 A 15 and secure the feet with studs 126 30 34.

P4 A 14	Plate for feet	P4 AA 22	Base plate
P4 A 15	Foot	126 30 34	Cheese head stud for P4 A 15 - P4 AA 22

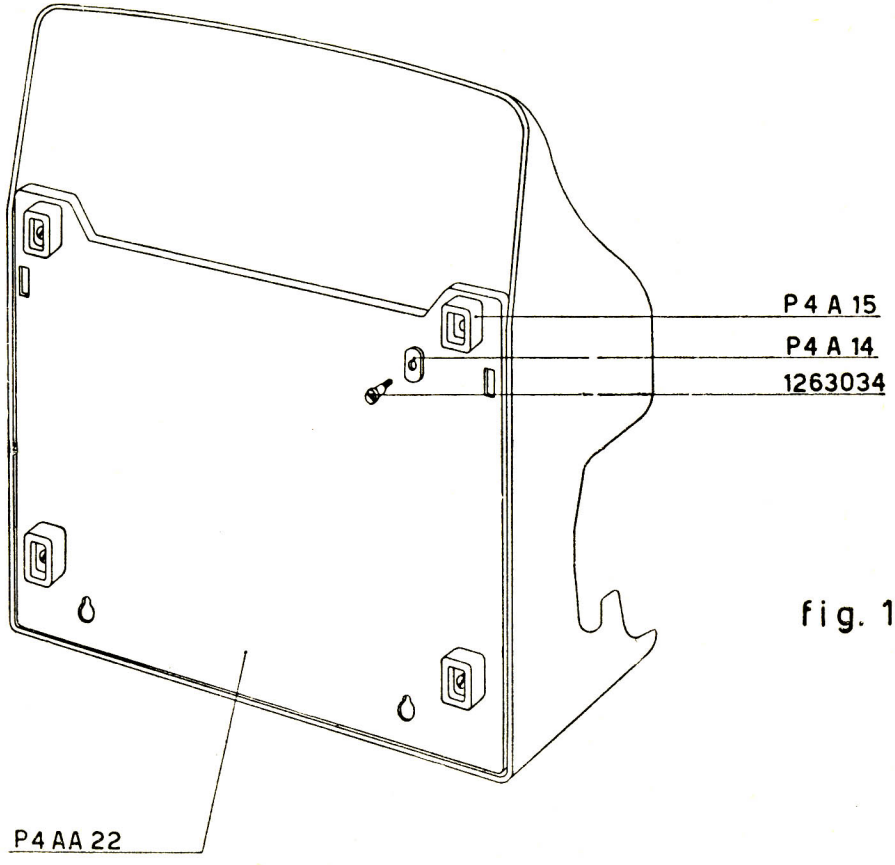


fig. 107

MODIFICATIONS

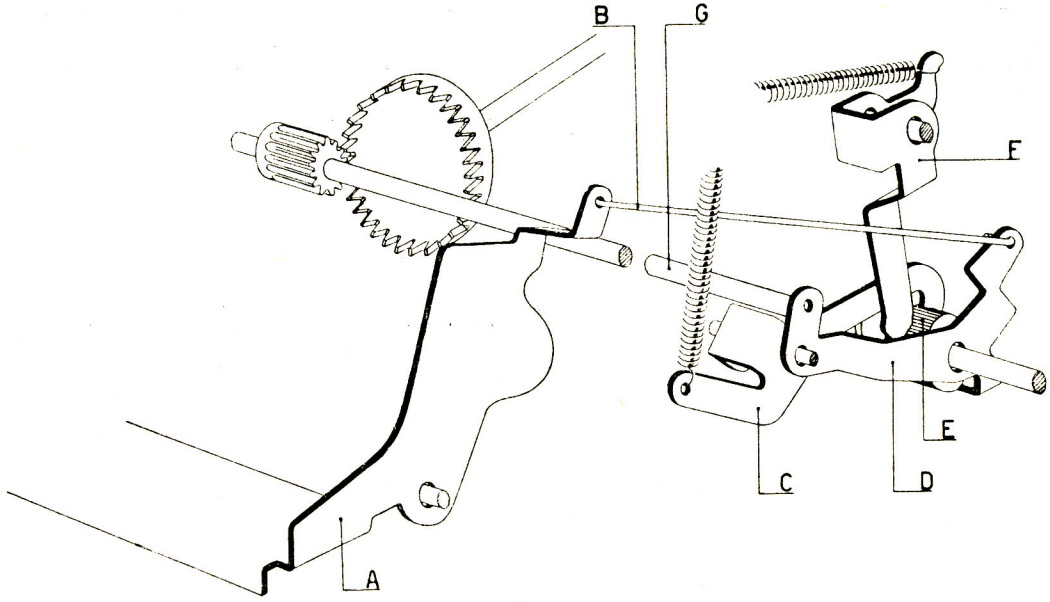
MODIFICATION OF THE FEED RIBBON MECHANISM

Beginning with serial number 782615 the feed ribbon mechanism has been modified.

Operations.

The front rotation of the lug controlling ribbon operation **A** makes rotate, by means of the pull rod **B**, the crank **D**. The movable pawl **C** has the same movement of the crank **D**, and its toothed end makes rotate the knurled pinion **E**. This last put into rotation the shaft **G**, which, by means of its two pinions, makes rotate one of the two ribbon spool.

When the lug return in its rest position, the pawl **C** jumps on the teeth of the pinion **E**. This last is kept in its new position by pawl **F**.


B
G
F
E
C
D
A

a) The new right ribbon carrying unit is shown in figure 108. The old bracket P4 EL 16 has been replaced by P4 EL 116 on which is riveted fixed pawl for ribbon advance **N**.

b) In place of the pinion P4 GL 105 and the frame P4 L 103 previously assembled on the horizontal shaft for ribbon advance, the following are now being used (figure 109):

— pinion P3 GL 6 with its screw 124 30 7;
— movable pawl for ribbon advance with crank P4 EL 204.

c) The spring 60 20 9 is hooked between bracket P4 EL 116 and P4 EL 204.

d) The spring 60 20 6 is hooked between the pawl **N** and the bracket P4 EL 116.

e) The adjustment of the ribbon return device is carried out as usual.

Superseded parts:		New parts:	
1 - P4 EL 16	Right spool shaft bracket.	1 - P4 EL 116	Right spool shaft bracket.
1 - P4 GL 105	Right pinion.	1 - P3 GL 6	Right pinion.
2 - P4 L 104	Spring for ribbon advance.	1 - 124 30 7	Screw for P3 GL 6
1 - P4 L 103	Ribbon advance frame.	1 - P4 EL 204	Movable pawl for ribbon advance with crank.
		1 - 60 20 6	Spring for right ribbon carrying unit pawl.

P4 EL 116	Right spool shaft bracket	124 30 7	Screw for P3 GL 6
P4 EL 204	Movable pawl for ribbon advance with crank	60 20 6	Spring for P4 EL 116
P3 GL 6	Right pinion	60 20 9	Spring for P4 EL 204

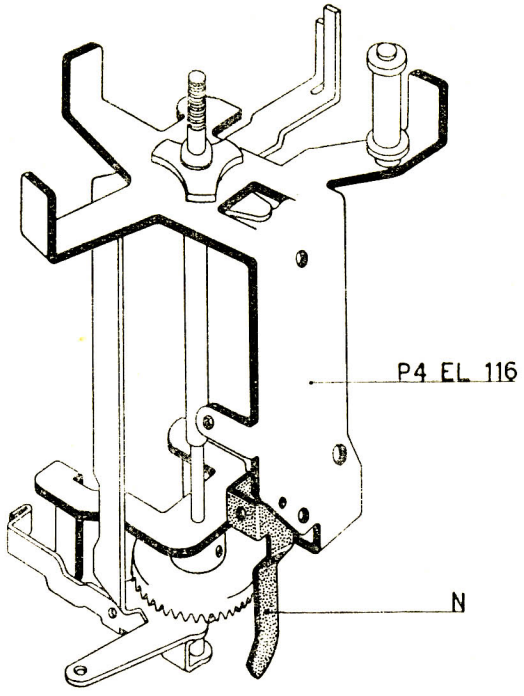


fig. 108

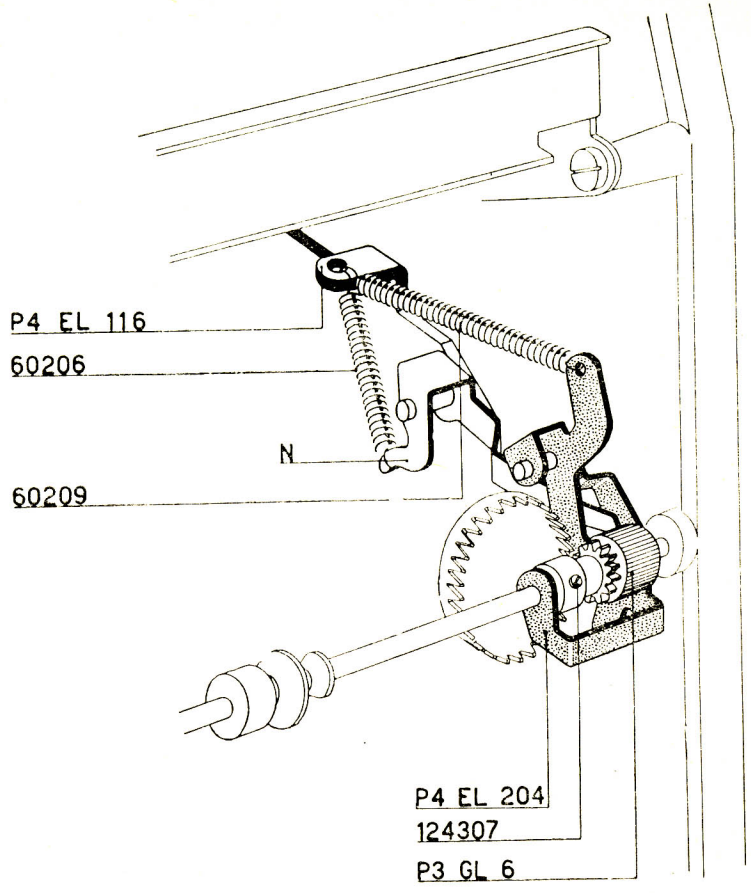


fig. 109

TESTING

Testing.

By testing is meant the entire range of test operations which must be carried out in order to ensure that the machine performs satisfactorily and does all it was designed to do.

The mechanic should therefore intervene in the case where, during testing, it becomes clearly evident that some device is not functioning perfectly.

It is preferable and more convenient to use the special test forms. These enable a complete check of all the devices in the machine to be made in about 13 minutes.

Using these forms, the following operations must be carried out:

a) Remove the cover from the body and, moving the carriage from left to right, make certain that the various parts of the machine are in good condition.

b) put test ribbon in machine;

c) insert two sheets of light weight paper (copy sheets), with carbon paper, on the platen, type a few lines and see that the type does not cut the paper and that the typing is uniform. Take out the paper and make sure that it is not wrinkled;

d) repeat the test with five copy sheets and corresponding carbon paper; type **L** and check that even the last copy is sufficiently clear;

e) repeat the test with cards;

f) set two-colour lever on neutral (stencil), lower the space bar and keep it down. Strike all the keys one after the other and make sure that each type bar is completely free. Set the two-colour lever back to black;

g) insert the test sheet, checking the alignment with one of the printed lines. Write the data relative to the machine, shown by the machine itself and carry out the following tests:

1) Inking and alignment: lock the shift on capitals and strike all the keys lightly, alternating the different letters or numbers with the letter H. Ensure that all the letters are equally inked at the top and the bottom and that they are all perfectly aligned with the letter H.

2) Return the shift to small letters and repeat the test, making certain that the same conditions obtained.

3) Shift: type a series of letter h, one small letter and one capital and then repeat the typing with the letters m, k, x, l. The lower edges of all the letters should be perfectly aligned.

4) With the two-colour change lever on black, strike a series of the characters which are the highest and the lowest; on the English keyboard these are / - ( ) % Q. Check that none of these characters are defective or smudged with red.

5) With the two-colour lever on neutral (stencil) repeat the typing of the same letters and check that the ribbon remains at rest. After a few strokes the typing will disappear completely.

6) With the two-colour lever on red, repeat the typing and check that no character is defective or smudged with black.

7) Ribbon carrier: when the two-colour lever travels from one position to the other, the ribbon carrier can move, but the ribbon should not go beyond the upper edge of the indicator. Carry out the following test as well: with the lever in the black position and the touch control in position 1, the ribbon carrier should not move when the shift is operated. Repeat the test with the touch control in position 4 where a movement of 1 mm. may be allowed.

8) Trips: carefully watching the typing during the tests on inking and alignment, and the shift and two-colour device tests, enables the operator to check that the letters are uniformly spaced and that the trip mechanism is therefore functioning properly.

9) Right-hand ribbon reverse: wind the ribbon on the left-hand spool, turning it by hand until the small left hook of the ribbon is near the right lug of the reverse control. At this point, type a series of letters and check that the ribbon reverses correctly without being stretched too taut.

10) Left-hand ribbon reverse: carry out the same operation for the other half of the reverse device.

11) Indicators: type a series of the letter i. Bring the indicator close to the platen with the hand and check that the graduations of the indicator are in line with the letters and that the bottom of these coincide with the upper edge of the indicator. Check that the indicators are parallel to the platen. Turn the platen by hand until the row of i reaches the bail bar. Check that the graduations on the bar are in line with the letters.

12) Back space: strike alternateley the i key and the space bar. Set the shift on capitals and strike an I after the last i. Operate the back space key three times consecutively and strike another I; this should be printed between two i; repeat until all the I are between all the i.

13) Clutch: operating the clutch, move the platen so as to type on the line prepared on the form.

14) Zero position: set the line space selector lever on zero position and move the platen so as to type successively on the various lines prepared for this purpose on the form.

15) Line spacing position: replace the line space selector lever in operating position and turn the platen, without using the clutch, until it is brought to the line; the printing should be in the identical position as that reached previously with the use of the clutch.

16) Margin setting: strike two full stops in the positions marked on the form for the left and right-hand margins. Place the two margin stops in position corresponding to the full stops and type a line, making sure that the locking of the keyboard and the space bar takes place correctly when the right-hand margin is reached and that letters do not pile on top of each other in the last space.

17) Indenting: lower the margin release key and return to the beginning of the line using the line spacing lever. The carriage should stop the number of spaces set before arriving at the margin. Return to the beginning of the line and type another complete line between the two margins. Continue to type up to the right-hand margin.

18) Margin release: return to the beginning of the line. Press the margin key and bring the carriage further to the right. Type a line. The carriage should pass back over the margin without difficulty. When the right-hand margin stop is reached, press the margin release key again.

It should be possible to continue typing up to the extreme right-hand end of the platen.

19) Column selector or tabulator: strike 4 full stops in the positions indicated on the form and set four stops to correspond with their positions: type a series of figures or words in columns. Clear the stops at the points indicated on the form. After having carried o ut the complete series of tests, move the carriage along the full length of its path, at the same time operating the clearer. Bring the carriage back to the beginning of the line and press the tabulator key. The carriage should run freely the whole length of its path.

20) Type, in the space provided, the results of the various tests indicated here.

21) Line spacing: place the line space selector lever in position 1 and set the margin conveniently. Strike the space bar and go back to the beginning of the line using the line spacing control lever. Repeat this operation several times. Place the line space selector lever in position 2. Strike the space bar two or three times and move the left-hand margin stops to the right until it stops. Strike the bar again and go back to the beginning of the line using the line spacing lever. Repeat this operation several times. Continue with these tests for the other positions of the line spacer.

22) Make the final typing test by typing the standard text printed on the form.

MAINTENANCE

Maintenance.

The Studio 44 machine is shipped to the Sales organization already lubricated. On account of the manufacturing methods and its funcional features it can be used for a number of years without the need for further lubricating.

The use of excessive oil is not recommended; it should be used only in cases of complete overhaul or washing of the machine.

For good maintenance it is necessary to:

— carefully remove dust and accumulated waste matter from erasures from the inside of the machine;

— clean the type carefully after having laid a strip of cloth under them. Clean them with the special brush. If they are very dirty a little gasoline may be used, taking care not to let drops fall on the type bars;

— lubricate, if it is really necessary, the escapement pinion, the various points of coupling, the pivot studs, the seats of the pull rods and links of the cinematics. Use vaseline oil;

— clean the guide slots of the guide comb carefully with a dry brush; do not lubricate;

— polish all chrome plated parts with a dry cloth;

— clean the cover carefully, using the special cleaner if necessary.

SPARE PARTS LIST

Spare parts are specified by code symbol, and name, for speedy and sure identification; code symbols and, if possible, the name should always be quoted when ordering spare parts or when submitting reports of mechanical defects, etc.

Spare parts are divided into three classes, viz.

Special parts, standard parts and units.

Special parts.

These consist of a single piece and are made for use on a particular machine. Their code symbols embody the following elements:

a) A key letter (or group letters or numbers) which indicates the machine in which the part is used. (Example: P4 = Studio 44).

b) A base letter (or group of letters) indicating the device in which the special part is used. (Example: P4-G = = Shift mechanism).

c) A number which clearly distinguishes a special part from all others used in a particular device. (Exampl: P4 - V - 1 = Tabulator lever).

Standard parts.

These consist of a single piece and are for the purpose of holding together, fixing and guiding. Since they can be used in different parts, devices and machines, their symbols do not contain key or base letters but are made up of the following groups of figures:

First groups: Defines the type and is formed of two or three digits. Three digits in the first group signifies that the part has a metric thread. The first of the three figures is always 1. (Example: 40... Washer; 120... Metric thread cheese head screw).

Second group: States the principal dimension intenths of a millimetre and is formed of two figures. (Example: 120 35... Metric thread cheese head screw, 3.5 mm. diameter).

Third group: Serves to distinguish between the various kinds of standard parts of the same type and principal dimensions. (Example: 120 35 2... Metric thread cheese head screw, 3.5 mm. diameter, type 2).

Units.

These consist of groups of two or more special parts or standard parts. If the grouping is effected at the factory it is known as a *shop unit*. The symbol for a shop unit is the symbol of the principal part of the unit with the addition, before the base letter, of one of the letters **E - G - H.**

If the grouping of special and standard parts is such as can be carried out with the means at the disposal of the Technical Service Department Workshops, the unit is known as an *assembly unit*.

The symbol for an assembly unit is the symbol of the principal part of the unit with the addition, before the base letter, of one of the letters **A - B - C - D.** These letters denote an ordered classification of units in cases where a unit comprises one or more sub-units.

FINDING THE SYMBOL

From the illustrations.

Compare the part with its illustration which will be found among the figures given in the instructions for assembly and adjustment (page 62 onwards). In these figures each part is shown with its appropriate code symbol. For easy and speedy reference, a list of the names and symbols of the parts appearing in each figure is given on the page facing the figure.

From the spare part list.

In order to facilitate the accurate checking of spare part orders, a list of all the specal parts, units and standard parts used in the « Studio 44 » will be found on page 208 and the pages following.

To assist the storekeeper, a short line has been printed, to the left of each symbol, on which may be written the number of the box, drawer or bin containing the part. At the side of each spare part is shown also the page number (or numbers) wherein reference is made to the particular part.

The parts have been listed in the following order:

1st. *Special parts and units distinguished by key letter P4 (Studio 44), grouped to the base letter:*

A = Frame - Cover;
B = Cinematic, Keyboard levers, first and second movement, touch control;
E = Type bars, universal frame;
G = Shift mechanism;
H = Space bar mechanism;
I = Escapement, rack;
L = Ribbon feed and reverse, two-colour device, ribbon carrier;
N = Back spacer;
O = Main spring;
P = Fixed guide;
Q = Lever stops, margin release, bell;
R = Movable carriage guide, lower and upper paper feed;
S = Carriage release;
T = Margin setting;
U = Platen, clutch, line spacing, platen knobs;
V = Tabulator.

2nd *Special parts and units distinguished by different key letters.*

These parts will also be found in the catalogues of the machines for which they were originally intended.

M2 = M 80; **M3** = M 80 El; **P3** = MP 3; **N3** = MC 14.

3rd *Standard parts grouped according to type.*

When the first group is composed of three figures (metric thread), the numerical order of the symbol ignores the first figure which, as previously explained, is always 1.

Example: **1 39** round nuts;
40 Washers;
1 42 Collars;
44 Split washers.

A — FRAME COVER

..... **P4 A 1** Side member, left hand, p. 78

..... **P4 A 2** Side member, right hand, p. 80

..... **P4 A 5** Key end first movement lever support, p. 62, 66, 68, 70, 72, 76

..... **P4 A 10** Leather strip for stop lever, p. 76, 180

..... **P4 A 14** Small plate for feet, p. 194

..... **P4 A 15** Foot, p. 194

..... **P4 EA 7** Carriage locking bracket with lever, p. 190

..... **P4 AA 17** Cover complete, p. 192

..... **P4 AA 22** Base plate, p. 194

B - CINEMATIC, KEYBOARD LEVERS, FIRST AND SECOND MOVEMENT LEVERS, TOUCH CONTROL

..... **P4 B 1** 1st. Row key levers, p. 64, 66

..... **P4 B 2** 2nd. Row key levers, p. 64, 66

..... **P4 B 3** 3rd. Row key levers, p. 64, 66

..... **P4 B 4** 4th. Row key levers, p. 64, 66

..... **P4 B 21** Spring carrying cross piece, p. 82

..... **P4 B 23/1÷43** First movement levers, p. 70, 96, 98

..... **P4 B 24/1** First movement link, p. 96, 98, 102, 128, 186

..... **P4 B 24/2** First movement link for levers 8 and 9, p. 96, 98

. ..... **P4 B 26** Second movement levers, p. 96, 98, 100

..... **P4 B 27/1** Second movement pull rod, p. 98, 100

..... **P4 B 27/2** Second movement pull rod, p. 98, 100

..... **P4 B 28** Keys and first movement lever wire pin, p. 66, 70, 72

..... **P4 B 29** Second movement lever wire pin, p. 96

..... **P4 B 30** Touch control trigger, p. 82

..... **P4 GB 31** Touch control spring crank, p. 82, 116

E — TYPE BAR SEGMENT, UNIVERSAL FRAME

..... **P4 E 1** Type bar segment p. 86

..... **P4 E 2** Wire pin for type bars, p. 100

..... **P4 E 3** Type bars, p. 100

..... **P4 E 4** Connecting cross pieces, p. 102

..... **P4 E 5** Type bar rest bearing, p. 100

..... **P4 E 13** Metal stop plate, p. 100

..... **P4 E 15** Left hand segment suspension connecting rod, p. 90, 94, 170

..... **P4 E 16** Right hand segment suspension connecting rod, p. 90

..... P4 E 18 Special stud for segment suspension rod, p. 90, 118, 120

..... P4 E 24 Universal frame - guide pin, p. 86

..... P4 E 25 Universal frame - stop bush, p. 86

..... P4 E 26 Frame guide bracket, p. 86

..... P4 E 27 Wire pin anchor plate, p. 100

..... P4 E 28 D Right hand wire pin anchor plate, p. 86, 96

..... P4 E 28 S Left hand wire pin anchor plate, p. 86, 96

..... P4 CE 1 Complete segment plate, p. 88

..... P4 GE 6 Left hand type bar segment plate support arm, p. 86

..... P4 GE 7 Right hand type bar segment plate support arm, p. 86

..... P4 GE 12 Type guide, p. 86

..... P4 GE 20 Universal frame complete, p. 86. 114, 164, 178

G — SHIFT MECHANISM

..... P4 G 4 Shift pull rod, p. 74, 94, 170

..... P4 G 9 Shift shaft with arms, p. 86, 90, 92, 94, 170

..... P4 G 10 Special stud for shift pull rod, p. 74, 190

..... P4 G 11 Shift regulator, p. 78, 80, 92, 94, 170

..... P4 G 12 Rubber cap for shift regulator, p. 78, 80, 92, 94, 170

..... P4 G 13 Spring, p. 94

..... P4 G 16 Shift lock lever, p. 62, 170

..... P4 G 17 Cheese head pivot stud screw, p. 62

..... P4 GG 3 Shift frame shaft, p. 62, 68, 74, 94, 170

H — SPACER

..... P4 H 3 Small spacer bar control frame, p. 112, 114, 172

..... P4 H 8 Space bar link, p. 114

..... P4 GH 1 Space bar, p. 66, 172

..... P4 GH 4 Connecting bar for space levers, p. 66, 72, 74, 82

..... P4 GH 7 Space bar control lever, p. 74, 114, 172

I — ESCAPEMENT, RACK

..... P4 I 3 Escapement wheel pin, p. 124

..... P4 I 5 Rack, p. 140, 144

..... P4 I 8 Spring for silencing finger, page 124

..... P4 I 11 Movable tooth of the escapement, p. 124, 128, 144, 186

..... P4 I 13 Special rack clamp screw, p. 140

..... P4 I 14 Fixed tooth position regulator p. 124, 126

..... P4 I 18 Spring for P4 EI 10, p. 126

..... P4 I 19 Spring for P4 I 11, p. 124

..... P4 GI 6 Escapement wheel and cog-wheel, p. 124, 128, 180

..... P4 EI 10 Escapement rocker plate with frame, p. 124, 126, 164

L — RIBBON FEED AND REVERSE, TWO COLOUR RIBBON CARRIER

..... P4 L 8 Ribbon feed horizontal shaft, p. 104, 106, 108, 110

..... P4 L 14 Spring for lug, p. 116

..... P4 L 25 Left hand reverse control lug, p. 84

..... P4 L 27 Pull rod connecting lugs, p. 106, 110, 172

..... P4 L 43 Eccentric for ribbon carrier stop, p. 80, 168

..... P4 L 45 Two-colour trip crank, p. 72

..... P4 L 48 Ribbon carrier shaft, p. 112, 166

..... P4 L 52 Spring, p. 112

..... P4 L 103 Ribbon feed frame, p. 104, 106, 108, 110, 116

..... P4 L 104 Ribbon feed spring, p. 104, 106

..... P4 BL 1 Lug controlling ribbon operation (with felt), p. 116, 166, 168

..... P4 EL 12 Spool shaft, p. 84, 110

..... P4 EL 15 Left hand spool shaft bracket, p. 84, 94, 108, 110

..... P4 EL 16 Right hand spool shaft bracket, p. 84, 106, 108

..... P4 EL 26 Right hand reverse control lug, p. 84

..... P4 GL 44 Two colour change lever, p. 62, 68, 72, 74, 112, 166

..... P4 EL 46 1st ribbon carrier crank with pull rod, p. 112, 116, 166

..... P4 GL 49 2nd ribbon carrier crank, p. 112, 114, 166

..... P4 GL 51 Ribbon lift, p. 114, 166

..... P4 GL 59 Sector for two colour change lever, p. 68, 74

..... P4 GL 105 Right hand ribbon feed pinion complete, p. 104, 106, 108

..... P4 EL 116 Right and spool shaft bracket, p. 198 b

..... P4 EL 204 Movable pawl for ribbon advance with crank, p. 198 b

N — BACK SPACING DEVICE

..... P4 N 1 Back space key lever, p. 66, 72, 180

..... P4 N 2 Back space pull rod, p. 180

..... P4 N 7 Back space and tabulator first movement lever, p. 72, 180

..... **P4 N 8** Special stud, p. 128

..... **P4 EN 6** Back space pawl with frame p. 128, 180

O — MAIN SPRING

..... **P4 O 1** Pin for carriage main spring drum, p. 130

..... **P4 O 4** Carriage main spring, p. 130

..... **P4 O 5** Carriage draw wire, p. 132

..... **P4 CO 1** Carriage main spring drum complete, p. 132

P — FIXED GUIDE

..... **P4 P 6** Upper lateral shank, p. 122

..... **P4 P 11** Guaduated indicator, p. 158, 188

..... **P4 P 12** Check carriage plate, p. 122, 142

..... **P4 P 13** Special screw, ,p. 122, 158, 188

..... **P4 P 20** Washer for front hearing, p. 122

..... **P4 GP 1** Carriage fixed guide with rocker pin, p. 118

..... **P4 EP 5** Complete upper central roller, p. 122

Q — LEVER STOPS, MARGIN RELEASE, BELL

..... **P4 Q 1** Margin release link, p. 172

..... **P4 Q 2** Margin release bracket, p. 118, 146, 172, 174

..... **P4 Q 4** Margin release lever, p. 66, 172

..... **P4 Q 9** Lever controlling vertical keyboard locking, p. 130, 146, 178

..... **P4 Q 10** Key lever locking frame, p. 76, 82, 172

..... **P4 Q 12** Frame lock eccentric, p. 130, 178

..... **P4 Q 22** Bell striker, p. 128

..... **P4 Q 34** Left hand release shaft bracket p. 146

..... **P4 Q 39** Stirrup controlling margin release, p. 146

..... **P4 Q 40** Right hand release shaft bracket p. 128, 146

..... **P4 Q 47** Release shaft spring, p. 146

..... **P4 EQ 8** Keyboard lock control lever with lock frame shaft, p. 130, 172, 178

..... **P4 GQ 30** Margin release rod, p. 146, 174, 176, 178

R — MOVABLE GUIDE - UPPER AND LOWER PAPER HOLDERS

..... **P4 R 5** Spring for paper holder shafts, p. 134, 156

..... **P4 R 6** Front protector plate, p. 158

..... **P4 R 7** Lower paper holder lever, page 134, 156

..... **P4 R 15** Right hand support for lower paper holder control frame, p. 134

..... **P4 R 28** Upper paper holder bar, p. 136

..... **P4 R 37** Leaf spring for paper holding plate, p. 156

..... **P4 CR 1** Small carriage sides with tabulator rail and tube, p. 134, 138

..... **P4 GR 9** Complete front paper feed roller, p. 156

..... **P4 GR 10** Complete back paper feed roller, p. 156

..... **P4 GR 16** Lower paper feed control, page 134, 156

..... **P4 CR 23** Paper pan with felt, p. 156

..... **P4 DR 24** Paper plate, p. 138

..... **P4 DR 31** Paper guide with braking element, p. 138

..... **P4 GR 30 D** Right hand upper paper feed arm, p. 136

..... **P4 GR 30 S** Left hand upper paper feed arm, p. 136

S — CARRIAGE RELEASE

..... **P4 S 3** Left hand carriage release lever, p. 136, 138, 140, 144

..... **P4 S 4** Right hand carriage release lever, p. 136, 138, 140

..... **P4 GS 5** Bracket for carriage release control, p. 140, 144

..... **P4 GS 8** Carriage release control p. 140, 144

T — MARGIN SETTING

..... **P4 T 1** Margin set rack, p. 148

..... **P4 T 4** Left hand margin block, p. 146

..... **P4 T 5** Right hand margin block, p. 146

..... **P4 T 6** Margin set stirrups, p. 146

..... **P4 T 12** Spring for margin set stirrups, p. 146

..... **P4 T 23** Left hand carriage safety stop, p. 138, 188

..... **P4 T 24** Right hand carriage safety stop, p. 138, 188

..... **P4 GT 2** Left hand margin set slider, pag. 146

..... **P4 GT 3** Right hand margin set slider, p. 146

..... **P4 CT 16** Graduated bracket with paper support, p. 148

U — PLATEN, CLUTCH, LINE SPACING, PLATEN KNOBS

..... **P4 U 5** Clutch shaft, p. 154

..... **P4 U 16** Line spacing wheel, p. 154

P4 U 18	Stop disc, p. 154
P4 U 24	Clutch piston control, p. 154
P4 U 31	Line spacing lever, p. 152
P4 U 34	Pull rod controlling line spacing, p. 150
P4 U 41	Pawl stop, p. 150, 152
P4 U 42	Roller fork, p. 150
P4 U 44	Spring for positioning tooth of line spacing wheel, p. 150
P4 U 45	Roller, p. 150
P4 U 53	Graduated sector, p. 150, 152
P4 U 58	Roller crank return spring, p. 150, 152
P4 U 59	Silencing element for line spacing lever, p. 150
P4 GU 1	Roller with rubber, p. 156
P4 CU 5	Left hand platen knob with clutch, p. 156
P4 DU 5	Clutch shaft with stop disc, p. 154
P4 GU 8	Left hand platen knob, p. 154
P4 GU 9	Right hand platen knob with shaft, p. 156
P4 GU 22	Clutch control button with bushing, p. 154
P4 HU 33	Lower line spacing crank with hub p. 150, 152
P4 EU 38	Line spacing control crank with pawl, p. 150, 152
P4 EU 49	Line spacing cam, p. 150
P4 GU 61	Line spacing lever bracket, page 150, 152

V — TABULATOR

P4 V 1	Tabulator lever, p. 66, 72, 180
P4 V 2	Link controlling stop setting and clearing lever, p. 160
P4 V 3	1st tabulator control pull rod, p. 180
P4 V 14	Lever for disengaging movable tooth, p. 128, 186
P4 V 15	Small tabulator controlshaft, p. 118, 174, 182, 184, 186
P4 V 36	Setter, p. 118, 120, 182, 184
P4 V 41	Clearer, p. 118, 120, 184
P4 V 73	Bracket supporting stops and springs, p. 120, 172, 184
P4 V 75	Cork for carriage brake, p. 186
P4 V 81	Plug for tube, p. 182
P4 V 83	Coiled spring for stops tube, p. 182
P4 V 85	Screw for tube, p. 138
P4 EV 12	Tabulator frame with square, p. 118, 120, 128, 180, 182, 186

..... **P4 EV 13** Tabulator finger, p. 118, 120, 182

..... **P4 GV 23** Stop setting and tabulator crank, p. 118, 146, 160, 174, 184

..... **P4 EV 24** Stop setting and clearing control lever bracket, p. 160, 170

..... **P4 GV 30** Control for clearer and setter, p. 118, 182, 184

..... **P4 GV 74** Carriage brake, p. 118, 120, 186

PARTS DERIVED FROM OTHER MACHINES

..... **P3 A 11** Rubber bush for attaching cover p. 192

..... **P3 B 22** Link for key levers, p. 66, 68, 72, 98, 112, 166

..... **P3 G 10** Flexible joint spring of shift, p. 190

..... **P3 G 20** Left hand suspension segment spring, p. 90

..... **P3 I 7** Movable tooth silencer finger, p. 124

..... **P3 I 12** V. T. trip regulator, p. 78, 80, 124, 162, 164

..... **P3 I 18** Friction washer for silencer finger, p. 124

..... **P3 L 2** Ribbon feed controll pull rod, p. 106, 116

..... **P3 L 19** Button securing spool, p. 110

..... **P3 L 31** Circular cam for reverse trips, p. 104, 110

..... **P3 L 33** Left hand ribbon feed pinion, p. 104, 108, 110

..... **P3 L 63** Spool braking spring, p. 84, 110

..... **P3 GL 6** Right pinion, p. 198 b

..... **P3 GL 11** Ribbon feed crown wheel, p. 84, 110

..... **P3 GN 12** Back space lever key, p. 180

..... **P3 O 2** Carriage main spring drum, p. 130

..... **P3 O 3** Carriage main spring drum cover, p. 130

..... **P3 Q 11** Margin releage key, p. 66

..... **P3 U 25** Spring for piston controlling clutch, p. 154

..... **P3 U 30** Spring washer for line spacing lever, p. 152

..... **P3 U 54** Line spacing sector fixing screw, p. 150

..... **P3 U 62** Line spacing lever stud, p. 152

..... **P3 V 4** Tabulator key, p. 66

..... **M2 B 25** Springs, p. 82, 118, 120, 186

..... **M2 GB 30** Key tops, p. 102, 170

..... **M2 E 28** Spring for universal frame and carriage release, p. 86

..... **M2 G 25** Shift key, p. 170

..... **M2 G 26** Shift lock key, p. 170

..... **M2 H 14** Flexible joint spring for shift movement, p. 74, 170

..... **M2 GL 77** Ribbon spool, p. 192

..... **M2 N 9** Large headed collet screw for back spacer, p. 128, 180

.....	**M2 P 16**	Ball bearing, p. 122, 142
.....	**M2 P 17**	Upper lateral roller, p. 122
.....	**M2 GP 9**	Lower right hand roller complete, p. 122
.....	**M2 GP 10**	Left hand and centre lower roller complete, p. 122
.....	**M2 Q 35**	Headless support screw for release shaft, p. 128, 146, 174. 176, 178
.....	**M2 Q 38**	Vertical upper margin release link, p. 146, 174
.....	**M2 Q 43**	Bell, p. 128
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